COMMONWEALTH MYCOLOGICAL INSTITUTE

REVIEW
OF
APPLIED MYCOLOGY

VOL. XXVIII NOVEMBER 1949

M[ARTIN]-L[EAKE] (H.). **The Sugar Cane in Jamaica.**—*Int. Sug. J.*, 51, 604, pp. 100–101, 1949.

In this article, part of which is devoted to the proceedings of the Jamaican Association of Sugar Technologists, the writer describes efforts by J. W. MACKAY to raise mosaic-free sugar-cane stock of the tolerant B 34104 variety [*R.A.M.*, 26, p. 170] in Jamaica. Of sets taken from ten stools of second ratoons and planted separately, two groups from single stools have remained mosaic-free into the ratoon crop. Dormancy was shown by the fact that in an early experiment 53 cases of infection occurred in the four months after planting and seven cases in the next two months. It is concluded that the disease spread occurring in practice is due to planting diseased material and it can be kept under control by establishing nurseries for planting material and by removing plants with secondary infection.

BELL (A. F.). **Twenty years of disease control.**—*J. Aust. Inst. agric. Sci.*, 15, 1, pp. 2–7, 1949.

In this presidential address delivered at the thirteenth general meeting of the Australian Institute of Agricultural Science at Hobart, Tasmania, in January, 1949, the last twenty years of sugar-cane disease control in Australia are reviewed. The progress made in this field is evident from a tabulated summary, in which the position of the ten most common sugar-cane diseases in 1928 is compared with that in 1948.

GOVINDU (H. C.). **Cerebella on Sugarcane.**—*Curr. Sci.*, 18, 5, pp. 180–181, 6 figs., 1949.

Spikelets of sugar-cane flowers at Hebbal, Bangalore, are extensively parasitized by a species of *Claviceps* resembling that reported by Thirumalachar from Mysore [*R.A.M.*, 23, p. 315]. The development of this fungus was inhibited by a species of *Cerebella* agreeing closely with the descriptions of *C. andropogonis* [ibid., 27, p. 100], which converted the sclerotia into greenish-black, cerebriform stromata, as reported by Langdon in the case of *C.* [*inquinans*] in Queensland [ibid., 21, p. 526]. The conidia of the sugar-cane *Cerebella* germinated readily in water, producing septate germ-tubes.

SHAW (C. G.). **Nomenclatorial problems in the Peronosporaceae.**—*Mycologia*, 41, 3, pp. 323–338, 2 figs., 1949.

In this paper the author's aim is to point out (1) the proper binomials and author citations for 24 species, representing the genera *Basidiophora*, *Bremia*, *Peronospora*, *Pseudoperonospora*, and *Plasmopara*, according to the present wording of Article 57 of the International Rules of Botanical Nomenclature; (2) the binomials and author citations in common use for these fungi; and (3) the binomials that would be valid if Bisby's proposed change in Article 57 [which would exclude the

Phycomycetes from the fungi dated from the description of the perfect state: cf. *R.A.M.*, 24, pp. 35, 473] were incorporated into the Rules. The full synonymy of each example is given.

Bremia ganglioniformis (Casp.) n. comb. is given as the correct citation of *B. lactucae* Regel because Caspary, by referring to both Tulasne's description of the oospores and Berkeley's original paper, fulfilled the requirements for valid publication. The genus should be cited *Bremia* Regel ex Schroet., or, briefly, *Bremia* Schroet.

Peronospora parasitica de Bary is given for *P. parasitica* (Pers.) Tul. If Bisby's proposal is followed, the citation becomes *P. parasitica* (Pers. ex Fr.) Fr. *P. schleideniana* Cornu is considered the correct citation of *P. destructor* (the author citation varies) or if Bisby's proposal is followed *P. destructor* (Berk.) Fries. The correct citation of *Plasmopara viticola* (Berk. & Curt.) Berl. & De Toni is *Plasmopara viticola* (de Bary) Berl. & De Toni, according to both Article 57 and Bisby's proposal concerning it, since Berkeley did not publish a description.

These and other examples given show that whether the present wording of Article 57 or Bisby's proposal is followed or not, changes in the binomials and author citations are necessary for certain species of the Peronosporaceae. Fewer changes in binomials will be required if Bisby's proposal is accepted than if Article 57 is strictly applied.

MUNDKUR (B. D.). **Morphology and cytology of development of the sex organs of Phytophthora himalayensis Dastur.**—*Bot. Gaz.*, 110, 3, pp. 475–486, 28 figs., 1949.

In a cytological study of the development and fertilization of the sex organs of *Phytophthora himalayensis* [*R.A.M.*, 28, p. 161] at the Indian Agricultural Research Institute, New Delhi, the author found that the oogonial incept penetrates the antheridium as in *P. erythroseptica*. Murphy's conclusion that the antheridial papillae serve to accommodate the pressure developed within the antheridium as a result of oogonial penetration [*Ann. Bot., Lond.*, 32, pp. 115–153, 1918] is not substantiated. A unique type of copulation, involving the antheridial papillae, is described.

POITRAS (A. W.). **A new aquatic species of Pythium.**—*Mycologia*, 41, 2, pp. 171–176, 17 figs., 1949.

A list is given of sixteen species of *Pythium*, including *P. multisporum* n. sp. isolated from soil near the Illinois River, Havana, encountered in the course of a study of the aquatic Phycomycetes of Illinois. The most distinctive characteristic of *P. multisporum* is that about 23 per cent. of the oogonia possess from two to six oospores.

BUCHWALD (N. F.). **Studies in the Sclerotiniaceae. I. Taxonomy of the Sclerotiniaceae.**—*Vet. Højsk. Aarsskr., 1949*, pp. 75–191, 7 figs., 1949.

The author's intensive critical studies on the Sclerotiniaceae fall into three main sections, comprising (I) a preliminary historical systematic synopsis, (II) proposals for systematic emendations, and (III) delimitation of the Sclerotiniaceae Whetz., 1945 [*R.A.M.*, 25, p. 235]. The following genera are ranked as Sclerotiniaceae *verae*: *Botryotinia*, *Ciboria* [ibid., 27, p. 498], *Ciborinia*, *Coprotinia*, *Lambertella* (? syn. *Phaeosclerotinia*) [ibid., 22, p. 455], *Martinia*, *Monilinia* [ibid., 7, p. 744], *Myriosclerotinia* [ibid., 27, p. 498], *Ovulinia* [ibid., 19, p. 412], *Rutstroemia* (syn. *Calycina* Gray, emend. Seav.) [ibid., 21, p. 99], *Seaverinia*, *Septotinia*, *Sclerotinia*, *Streptotinia*, *Stromatinia*, and *Verpatinia*. Three further genera are classed as Sclerotiniaceae dubiae pending the classification of their present anomalous systematic position, viz., *Phaeociboria* v. Höhn. 1918, *Chloroscypha* Seav. 1931, and

Chloriciboria Seav. 1936. The names *Septotis* n.g. and *Ovulitis* n.g. are proposed for the conidial states of *Septotinia* and *Ovulinia*, respectively.

The arguments for and against the alleged genetic connexion between *Botrytis cinerea* and *Sclerotinia fuckeliana* [ibid., 28, p. 490] are discussed. It is pointed out that the older mycologists, regarding *B. cinerea* as a morphological and biological unity, believed that they were referring to one and the same species, whereas in fact they were concerned with a number of different entities. *S. fuckeliana*, however, is an exclusive parasite of the vine, and hence the *Botrytis* state develops mainly in central and southern Europe [ibid., 4, p. 460 *et passim*]. For the conidial state of this well-defined species within the collective *B. cinerea* the name of *B. fuckeliana* n.sp. is proposed.

To *Botrytis* Pers. emend. Buchw. should be referred only species congeneric with the type species, *B. cinerea*, and consequently the genus is limited to parasitic forms having their apothecial state in *Botryotinia* or *Seaverinia*. The new interpretation of *Botrytis* necessitates the rejection of Saccardo's classification, and the emended genus is accordingly subdivided into three new subgenera, i.e., *Eubotrytis* (*Genuini*), with conidia of the *cinerea* type (type species *B. fuckeliana*); *Sphaerobotrytis*, with globose, usually large conidia (type species *B. polyblastis* [ibid., 20, p. 466]); and *Verrubotrytis*, with verrucose conidia (type species *B. geranii* n.n.). *Eubotrytis* is further differentiated into two sections, *Macrosclerotiophorae*, with sclerotia usually exceeding 1 mm. in diameter, and *Microsclerotiophorae*, with sclerotia of smaller dimensions. A list of the principal species in each section is given.

In agreement with Whetzel, species of *Sclerotinia* with a *Botrytis* state of the *cinerea* type are referred to *Botryotinia*, *B.* (*S.*) *fuckeliana* being proposed as the type species instead of *B.* (*S.*) *convoluta*, suggested by Fitzpatrick on grounds of priority. The two new subgenera of *Botryotinia* are *Eubotryotinia* (type species *B.* (*Peziza*) *fuckeliana*) and *Sphaerobotryotinia* (type species *B.* (*Sclerotinia*) *polyblastis* [loc. cit.]).

The genus *Ciboria* is to be restricted to species attacking inflorescences or fruits or seeds [ibid., 27, p. 498], the organs of which are more or less extensively stromatized. It comprises two subgenera, *Euciboria* Boud., the apothecia of which are developed from stromatized inflorescences (especially male catkins) of frondose trees, with the type species *C. caucus* (Rebent.) Fuckel, and *Stromatinia*, with apothecia arising from stromatized fruits or seeds, the type species being *C. batschiana* (Zopf) Buchw. (syn. *Sclerotinia pseudotuberosa* Rehm).

The genus *Sclerotinia* comprises two natural main groups, namely, *Sclerotiniae herbicolae* (*Eusclerotinia*), with the type species *S. sclerotiorum*, and *Sclerotiniae frondicolae* (*S. candolleana*). The representatives of *Eusclerotinia* are again subdivided into *Macrosclerotiophorae* (*S. sclerotiorum*) and *Microsclerotiophorae* (*S. minor*) and listed accordingly.

A general characterization of the Sclerotiniaceae is given, concluding with a diagnosis of the family and a synopsis of the genera, subgenera, and sections included therein, with special reference to the European forms.

In the course of this study the author refers to the genus *Phymatotrichum*, founded by Bonorden on three species, two of which belong to *Hyphelia* (fide Melin & Nannfeldt [ibid., 14, p. 274]) and one to *Botryosporium* (fide Costantin 1888, and Lindau 1907). The genus should therefore be discarded. The well-known *P. omnivorum* is, according to Shear [ibid., 4, p. 636], a resupinate *Hydnum* and the present author considers it closely related to *Hyphelia*.

Miller (J. H.). **A revision of the classification of the Ascomycetes with special emphasis on the Pyrenomycetes.**—*Mycologia*, 41, 2, pp. 99–127, 37 figs., 1949.

The author proposes a tentative regrouping of the fungi previously placed in the Sphaeriales, Dothideales, and Hypocreales, based primarily on characters of the

ascus correlated with ascocarp centrum characteristics. Some suggestions for rearranging other orders are also given. It is believed that this will result in a more natural system and will enable keys to be made that can be used by the student as well as the expert. The suggested changes are demonstrated in a key appearing at the end of the paper.

Mix (A. J.). **Some new species of Taphrina.**—*Trans. Kans. Acad. Sci.*, 50, 1, pp. 77–83, 1 fig., 1947. [Received June, 1949].

Descriptions are given of the following species of *Taphrina* [cf. *R.A.M.*, 17, p. 841; 18, p. 820; 26, p. 137]: *T. blechni* Bres. n.sp. on *Blechnum* sp., *T. populi-salicis* n.sp. on *Populus* and *Salix* spp., *T. americana* n.sp. on *Betula* spp., *T. orientalis* n.sp. on *Pyrus lindleyi*, *T. padi* n.sp. on *Prunus padus*, *T. thomasii* n.sp. on *P. ilicifolia*, and *T. darkeri* n.sp. *on Acer circinatum*.

Mix (A. J.). **A monograph of the genus Taphrina.**—*Kans. Univ. Sci. Bull.*, 33, 1, pp. 3–167, 39 figs., 1949.

In this monograph the author re-describes and re-defines 98 species of *Taphrina* [see preceding abstract], other species being reduced to synonymy or excluded. They are distributed by hosts as follows: on ferns 24 species, on *Populus* and *Salix* 4, on Betulaceae 23, on Fagaceae 5, on Ulmaceae 2, on Rosaceae (except *Prunus*) 7, on *Prunus* 17, on *Rhus* 1, on *Acer* 11, on *Aesculus* 1, on *Sebastiana* 1, and on Zingiberaceae 2.

Routien (J. B.). **Crebrothecium ashbyi.**—*Mycologia*, 41, 2, pp. 183–185, 1949.

Eremothecium ashbyi, first proposed in 1935 [*R.A.M.*, 14, p. 693], was not published validly according to Article 38 of the International Rules of Botanical Nomenclature. In preparing a formal description the author found a number of fundamental differences between *E. ashbyi* and *E. cymbalariae*, the type species, and considers that the two fungi should be placed in different genera. He proposes the name *Crebrothecium* n. gen. with *C. ashbyi* n. comb. as the type species.

Gadd (G. H.). **Nutrition in relation to disease.**—*Tea Quart.*, 20, 1, pp. 10–18, 1949.

In this paper, read at the eighth conference of the Tea Research Institute of Ceylon, 1949, the author, dealing with the relationship between food reserves and disease in the tea bush, states that experience in the last two years has shown that the extent of the damage caused by blister blight (*Exobasidium vexans*) [*R.A.M.*, 28, pp. 34, 145] depends largely on the agricultural treatment the bushes receive. While spraying is effected in nurseries with good results its general use in tea plantations is impracticable and uneconomical because of the number of applications required.

As *E. vexans* is unable to feed on fully grown leaves, it is unlikely to kill a bush unless favoured by climatic conditions all the year round. The spores are short-lived, and a few hours' direct sunshine kills them. They survive best in cold, sunless weather and begin to grow when wetted by dew, mist, and rain. The leaf enveloping the bud and the first from the bud are easily infected, but as the leaf ages it becomes more difficult to infect. Usually, the third leaf from the bud cannot be infected.

The Institute's recommendation is, during severe infection to pluck often and close. When weather conditions improve and infection dies down, a period of close plucking should be followed by one of light, to increase the permanent foliage. Although the improved weather brings out young leaves abundantly, plucking to make good a short crop must not be effected until a good canopy has formed. These recommendations can be summed up as 'bush management,' which means more than adherence to fixed rules and implies personal judgement and a knowledge

of fundamental principles. The importance of permanent foliage to a bush cannot be over-emphasized.

Premature blackening of the blisters is due to other fungi, mainly *Colletotrichum camelliae* [*Glomerella cingulata*: ibid., 18, p. 729].

Limasset (P.), Cornuet (P.), & Gendron (Y.). **Titrage du virus de la mosaïque du Tabac (Marmor tabaci Holmes) dans les organes aériens de Tabacs infectés.** [Titration of the Tobacco mosaic virus (*Marmor tabaci* Holmes) in the aerial organs of infected Tobacco plants.]—*C. R. Acad. Sci., Paris*, 228, 24, pp. 1888–1890, 2 graphs, 1949.

Using the ordinary methods for the assay of tobacco mosaic virus in the leaves (maceration of the tissues and titration of the virus in the juice, either by serological procedures or by means of local lesions), the writers arrived at the usual conclusion as to the low virus content of old leaves (about four times less in the ninth than in the fifth). Quite a different picture, however, was presented by plants tested by Bawden and Pirie's method (*Brit. J. exp. Path.*, 27, pp. 81–90, 1946), whereby large quantities of virus are extracted from the fibres treated with enzymes from the alimentary tract of the snail [*R.A.M.*, 27, p. 536]. In this series the maximum virus content occurred in the tenth leaf (only a little less than that of the fifth in the first series), followed by the sixth to the ninth and the 18th and 19th. In both series the virus content fell to a minimum in the leaves still enclosed in the terminal bud or just emerging from it [see next abstract].

Limasset (P.) & Cornuet (P.). **Recherche du virus de la mosaïque du Tabac (Marmor tabaci Holmes) dans les meristèmes des plantes infectées.** [Search for the virus of Tobacco mosaic (*Marmor tabaci* Holmes) in the meristems of infected plants.]—*C. R. Acad. Sci., Paris.*, 228, 25, pp. 1971–1972, 1949.

When the leaves of very young Samsun tobacco plants were inoculated, after dusting with carborundum, with the expressed juice from the cap of meristem, situated just above the first foliar rudiments, of a plant infected by the tobacco mosaic virus, only 8 out of 15 tests were successful and the incubation periods were very lengthy (19 to 47 days). On the other hand, inoculations with the fraction of the meristem situated immediately below the foliar rudiments (which were amputated) gave uniformly positive results. Thus, the virus content of the terminal meristem is exceedingly low, as was to be expected from the results of previous experiments on leaves of different ages [see preceding abstract]. Moreover, nearly all the strains isolated from the leaves in the present series of tests presented aberrant characters and were regarded as mutants. The high auxin content of the meristems may account for the scarcity of virus. One of the authors has shown that 2, 4-dichlorophenoxyacetic acid, which presents certain analogies with growth substances, exerts a marked inhibitory action on the Tobacco mosaic virus [cf. *R.A.M.*, 28, p. 35].

Ryjkoff (V. L.) & Smirnova (Mme V. A.). Действие ионов магния и акридиновых препаратов на накопление вирусного белка мозаичной болезни Табака. [The effect of magnesium ions and acridine preparations on the accumulation of virus protein in plants affected with Tobacco mosaic virus.]—*Микробиология* [*Microbiology*], 17, 3, pp. 267–270, 1948.

The results of experiments conducted at the Microbiological Institute of the U.S.S.R. Academy of Sciences, Moscow, demonstrated that when half leaves of *Nicotiana glutinosa* plants inoculated with tobacco mosaic virus were kept submerged for seven days in a 0·1 per cent. solution of magnesium sulphate, the multiplication of the virus was markedly depressed. The same effect was observed

in tobacco leaves infiltrated with a 0·05 per cent. trypaflavine solution. A 0·001 per cent. trypaflavine solution depressed the necrotic reaction of *N. glutinosa* leaves. Of 16 young tomato plants, parts of which were inoculated and immersed immediately afterwards in a 0·1 per cent. solution of magnesium sulphate for five days, none showed any symptoms after 21 days, while of the same number of control plants immersed in water nine showed the disease. Similarly, a 0·01 per cent. solution of rivanol can protect inoculated tomato plants from infection.

Rivanol and trypaflavine precipitate the tobacco mosaic virus protein from the solution. This precipitate remains infective after dialysis.

BODE (O.). **Über ein vom Tabak isoliertes Virus ('EN') mit stark nekrotischer, auf die Infektionsstelle beschränkter Wirkung.** [On a virus ('EN') isolated from Tobacco with a strongly necrotic action confined to the site of infection.]—*Phytopath. Z.*, 15, 1, pp. 62–72, 2 figs., 1 graph, 1948.

From a single large necrotic spot on one leaf of a Samsun Baschi Bagli tobacco plant inoculated with the green strain TM/W of the tobacco mosaic virus [*R.A.M.*, 28, p. 88] a virus designated EN was isolated in the winter of 1942. It is in all probability identical with the tobacco necrosis virus of W. C. Price [ibid., 18, p. 211] but not with that described under the same name by Smith and Bald [ibid., 14, p. 798]. It is concluded that all three viruses are strains of the same virus, but that Price's tobacco necrosis and EN are to be differentiated from Smith and Bald's as a special variant [cf. ibid., 28, p. 290]. The question of the relationship of EN to the tobacco mosaic virus is discussed and the similarities and dissimilarities between the two are summarized. No certainty as to the origin of EN is attainable from this line of approach, but if the new virus is assumed to be a variant of the tobacco mosaic virus it must be a very highly aberrant one, far more so in any case than the recently described paramosaic virus of tobacco [ibid., 28, p. 88].

The development of foliar symptoms is confined in all hosts to the individual sites of inoculation, which expand into necrotic lesions, reaching their maximum extent in tobacco, being slightly less in *Nicotiana glutinosa*, and much smaller in *Datura stramonium*, while in chilli no enlargement occurs. Evidently these plants present varying degrees of resistance to the virus. The inactivating property of expressed juices from the leaves of healthy plants was found to be weakest in tobacco, rather stronger in *N. glutinosa*, much more powerful in *D. stramonium*, and strongest of all in chilli. These data correspond exactly with the symptomatological observations. Hence it may be deduced that the inactivating principle operative in the expressed juice is identical with that which prevents the expansion, or even, as in the case of chilli, the development, of the lesions in the living leaf. No virus could be demonstrated in the petioles of inoculated tobacco leaves.

A comparison of the host ranges of the several viruses under discussion revealed a far-reaching correspondence between EN and the two tobacco necroses, whereas the tobacco mosaic virus differed markedly from the others in this respect.

The thermal point of EN lies just above 90° C. and its dilution end point between 1 in 3,000 and 1 in 10,000.

HUTTON (E. M.) & PEAK (A. R.). **Spotted wilt resistance in the Tomato.**—*J. Aust. Inst. agric. Sci.*, 15, 1, pp. 32–36, 1 fig., 1949.

Under field conditions in Australia, the tomato varieties Pearl Harbor [*R.A.M.*, 25, p. 142; 28, p. 252] and Mangana [ibid., 28, p. 91] have proved susceptible to spotted wilt. Hybridization work has been carried out at Canberra between Porter's highly resistant strain of *Lycopersicon pimpinellifolium* [ibid., 23, p. 461] and commercial varieties, with the object of breaking the apparent linkage between growth characters and spotted wilt resistance in the former. The results showed that the factor for spotted wilt resistance is highly recessive and dependent on

multifactorial inheritance. In back-crosses with Sioux the spotted wilt resistance became stabilized in the fourth generation, through intensive greenhouse selection.

In field trials under epidemic conditions hybrids from Porter's strain of *L. pimpinellifolium* used as one parent, though severely affected, had higher survival percentages than Pearl Harbor and Mangana. About 20 per cent. of the plants of hybrids 5b1 and 5c10 retained the high resistance of the wild parent, and about 25 per cent. completely recovered from the disease. Their commercial qualities, however, are still not acceptable.

Ellis (D. E.) & Garriss (H. R.). **Control Tomato late blight.**—*Ext. Circ. N.C. Coll. Agric.* 331, 8 pp., 2 figs., 1 graph, 1949.

In a comparative experiment at Hendersonville, North Carolina, in 1948, the best control of tomato blight (*Phytophthora infestans*) was obtained by spraying or dusting with tribasic copper sulphate [*R.A.M.*, 28, p. 36], which resulted in yields of over 430 bush. high-grade fruit per acre, as against approximately 130 bush. in the untreated plots, and reduced the incidence of infection from about 65 to 15 per cent. or less. Parzate and zerlate were less effective but gave a substantial measure of control. Other fixed copper compounds, such as copper-A or cuprocide, may also be used against the disease. The sprays should contain a minimum of 2 lb. actual copper per 100 gals. water and the dusts 6·5 (preferably 7) per cent. For essential thorough coverage the former should be applied at the rate of 100 to 150 gals. and the latter at 35 to 45 lb. per acre for each treatment. The symptomatology and etiology of blight are briefly described.

De Carvalho (T.). **Porque foi proibida a importação de Tomates e sua semente da União da Africa do Sul.** [Why the importation of Tomatoes and their seed from the Union of South Africa was prohibited.]—*Gaz. Agric. Moçambique*, 1, 1, pp. 8–9, 1 fig., 1949.

At the end of 1948 bacterial canker (*Corynebacterium michiganense*) was observed on tomatoes in various parts of South Africa, including the Nelspruit area. The proximity of this region to Mozambique consituted a serious threat to the Colony and necessitated legislative measures for the exclusion of the disease. On 2nd April, 1949, therefore, an order was published in the *Boletim Oficial* prohibiting the importation into Mozambique of tomatoes from South Africa and requiring that consignments of seed from the Union be accompanied by a duly authenticated certificate vouching for its production by canker-free plants. However, the scarcity of indigenous tomatoes at this season prompted a revision of the terms of the order on 21st May to permit the importation from South Africa of fruits in sealed containers accompanied by two certificates, one of origin and the other guaranteeing the absence of bacterial canker from the region of provenance.

Larsen (P.). **Undersøgelser over Dannelsen og Væksten of rødkerne hos Bøg.** [Studies on the formation and growth of red heart in the Beech.]—*Dansk Skovforen. Tidsskr., 1943*, 10, pp. 437–474, 4 figs., 4 graphs, 1943. [Received June, 1949.]

This is a fully tabulated survey and discussion of the writer's studies on red heart of beech, which covered an experimental period of three to four years, beginning in 1938, in three Danish forests [*R.A.M.*, 23, p. 201]. By means of measurements on increment borings the average annual expansion in the diameter of already existing areas of red heart was estimated at 3·5 mm. Comparing the age and diameter of the trees, the annual increase of red heart was computed at 2·8 to 3·2 mm. In trees of the same age the percentage of red heart wood is highest in the thickest, while in trees of uniform diameter it reaches a maximum in the oldest.

Thus, the extent of red heart in the wood increases both with the age and with the diameter of the trees. No conclusions could be drawn, however, as to the relative importance of these two factors in the production of the defect, nor was any correlation traceable between new red heart formations and the increment, shape, or position of the trees and the extent of felling operations. At most three zones could be discerned in the areas of red heart developing during the three to four years of the investigations.

YOUNG (R. A.). **Studies on Oak wilt, caused by Chalara quercina.**—*Phytopathology*, 39, 6, pp. 425–441, 2 figs., 1 diag., 1 graph, 1949.

In the course of intensive studies on oak wilt (*Chalara quercina*) in several parks and forests in Iowa [*R.A.M.*, 28, p. 364] it was found that the pattern of spread did not conform to that of wind-blown spore or insect dissemination. In evenly distributed stands the movement of the disease was roughly concentrical from a given site of infection outwards to the nearest healthy trees for an average distance of 30 to 40 ft. within three years. Differences between the percentages of wilt in red and white oaks were unimportant (averages of four plots, 13 and 9·4, respectively), but the disease was much more destructive to the former than to the latter at one of the State parks in 1945, the mortality percentages being 52·9 and 28·3, respectively, while burr oaks were even more resistant (19·9) than the white, and Hill's yellow (*Quercus ellipsoidalis*) more susceptible (55·4) than the red (*Q. borealis*). No difference was observed in the incidence of infection on trees of different sizes, nor did cross-inoculation tests yield any evidence of host specificity.

C. quercina was isolated from all parts of diseased trees except the acorn. In microtome sections of diseased tissue from five red and three white oaks the fungus was detected in xylem vessels of the leaf midribs, petioles, and stems. The tracheae harboured conidia, which passed freely through red and white oak stem sections in aqueous suspension.

Isolates grew well at a temperature range from 16° to 28° C. [cf. ibid., 24, p. 79], with the most rapid development between 22° and 26°. The optimum range for spore germination was from 25° to 30°: at the former temperature the germ-tubes of all germinating spores typically produced conidia, while at the latter more than 85 per cent. of the spores formed vegetative hyphae on germination. Potato dextrose and oatmeal agars were the best of the media tested, but other complete nutrients also supported growth. A 1 per cent. dextrose concentration was optimal for sporulation. Spore production from germinating spores tended to increase with a reduction in the sugar concentration from 4 to 0·1 per cent. The minimum, optimum, and maximum hydrogen-ion concentrations for the growth of *C. quercina* were pH 3, 5 to 7, and 9, respectively.

A metabolic product which readily induced wilting of tomato and oak cuttings was secreted by the fungus on a modified Richards's solution containing asparagine and yeast extract. The symptoms on toxin-wilted oak cuttings were typical of those resulting from inoculation on greenhouse oaks.

HIRT (R. R.). **Decay of certain northern hardwoods by Fomes igniarius, Poria obliqua, and Polyporus glomeratus.**—*Phytopathology*, 39, 6, pp. 475–480, 1 fig., 1949.

Fomes igniarius was isolated from aspen (*Populus tremuloides*) [*R.A.M.*, 28, p. 439], beech (*Fagus grandifolia*), elm (*Ulmus americana*), and *Ostrya virginiana* at the Pack Demonstration Forest, Warrensburg, New York. With minor variations, the isolates from fertile sporophores grew in the characteristic manner in culture [*R.A.M.*, 16, p. 715; 17, p. 423]. Each isolate was inoculated into forest trees of aspen, beech, *O. virginiana*, and sugar maple (*Acer saccharum*), and all

became established in the several species, regardless of the host source of the inoculum, with the exception of the aspen isolate on *A. saccharum*. All the hosts except beech sustained extensive damage from heart rot.

Poria obliqua from yellow birch [ibid., 18, p. 145] caused severe heart rot in its own host and aspen but relatively little decay in beech and *A. saccharum*.

Polyporus glomeratus, isolated from a sterile sporophore on beech [ibid., 26, p. 429] and inoculated into the same host and yellow birch, caused decay in both species.

Sporophores of *F. igniarius* were produced after six years on *O. virginiana* by an isolate from beech and after ten years on aspen by an isolate from the same host. It is recommended that during cutting operations in hardwood stands all trees infected with *F. igniarius*, and birch and beech bearing sterile sporophores of such species as *Poria obliqua* and *Polyporus glomeratus* should be removed and the logs disposed of in such a way as to obviate the production of fertile sporophores thereon.

GRAVATT (G. F.). **Chestnut blight in Asia and North America.**—*Unasylva*, 3, 1, pp. 3–7, 1 pl., 5 figs., 1 map, 1949.

After briefly describing the symptoms of chestnut blight (*Endothia parasitica*) [*R.A.M.*, 28, p. 428] the author discusses the resistance shown by the Asiatic species, and traces the history of the disease in the United States, with special reference to the work done there on breeding for resistance.

THIRUMALACHAR (M. J.). **Telia of the leaf-rust on Teak.**—*Curr. Sci.*, 18, 5, pp. 175–177, 3 figs., 1949.

For the first time since the description of *Uredo tectonae* on teak [*R.A.M.*, 8, p. 76] by Raciborski in 1900, teleutosori and teleutospores of the rust were collected, near Bangalore, in March and April, 1949. Macroscopically the teleutosori are indistinguishable from the uredosori, both being of the same orange-yellow colour, and no doubt this is why the former were overlooked for so long. The clavate or fusoid-clavate, sessile teleutospores, with orange-yellow contents and hyaline walls, measuring 38 to 51 by 6 to 9 μ, are formed either intermixed with the uredospores or in separate sori. They germinate immediately at maturity, producing a long, quadriseptate promycelium with globular sporidia on sterigmata. The orange-yellow, ovate-ellipsoid, densely echinulate uredospores measure 20 to 27 by 16 to 22 μ. The marginal, cylindrical, incurved, orange-yellow paraphyses, with walls up to 2·5 μ thick, are the same in both stages.

The structure of the uredo- and teleutosori of the teak rust point to relationship with the genus *Olivea* Arth. (*Mycologia*, 9, pp. 55–104, 1917), and a careful scrutiny of type material of *O. capituliformis* confirmed this supposition. The fungus is therefore transferred to *Olivea* as *O. tectonae* (Racib.) Thirum., n. comb.

GÄUMANN (E.). **Der Einfluss der Meereshöhe auf die Dauerhaftigkeit des Lärchenholzes.** [The influence of altitude on the durability of Larch wood.]—*Mitt. schweiz. ZentAnst. forstl. Versuchsw.*, 25, 2, pp. 327–393, 2 pl., 47 graphs, 1948. [French summary.]

This is an expanded, fully tabulated account of the author's studies on the influence of altitude on the susceptibility of larch heartwood to rotting by *Polyporus vaporaria* (*Poria vaillantii*) [*P. vaporaria*], a note on which has already appeared [*R.A.M.*, 25, p. 323]. The results of preliminary tests indicated that the experimental data obtained in connexion with *P. vaporaria* were equally applicable to *Lenzites abietina*, *Merulius domesticus* [*M. lacrymans*], and *Trametes* [*Fomes*] *pini*.

Smith (Virginia M.). **On the mechanism of enzyme action. XXXVI. Dehydrogenation studies on Merulius lacrymans and Marasmius chordalis, and the mechanism of oxalic acid formation.**—*Arch. Biochem., N.Y.*, 22, 2, pp. 275–287, 3 graphs, 1949.

Studies on *Merulius lacrymans* and *Marasmius chordalis* (an occupant of Swedish soils) on a synthetic medium containing 2 per cent. glucose demonstrated the course of degradation acetate→glycolate→glyoxalate→oxalate as one of the channels of the phase sequence of carbohydrate breakdown by fungi of the wood-destroying group [cf. *R.A.M.*, 28, p. 430]. The two organisms were shown to dehydrogenate sorbitol, adonitol, isopropyl alcohol, and ethyl alcohol. In the case of *Merulius lacrymans* the isolability of intermediates is strongly influenced by temperature variations: the optimum for its growth is 22° C. and the maximum 25° to 26°. Oxalic acid production is continued by this species even under acid conditions, the free acid accounting for the acidity of the medium.

Sprau (F.) & Minckwitz (A. v.). **Bekämpfung pilzlicher und tierischer Schädlinge im Frühgemüsebau.** [Control of fungal and animal pests in early vegetable culture.]—*Pflanzenschutz*, 1, 6, pp. 66–69, 1 fig., 1949.

The following are among the measures recommended for the control of the group of propagation fungi responsible for damping-off, black leg, or root rot of early vegetables in Bavaria, e.g., *Pythium debaryanum*, *Moniliopsis aderholdi* [*R.A.M.*, 28, p. 499], and (on cabbage) *Olpidium brassicae* [ibid., 25, p. 88]. Sand or peat mould should be incorporated with heavy soil, using fresh soils if procurable, otherwise sterilization must be undertaken by steam or chemicals, such as formalin (1 l. of a 40 per cent. solution in 40 l. water per 4 cu. m. soil), abavit, ceresan, fusariol-neu, or germisan (10 gm. in 4 to 10 l. water per sq. m. soil, or 50 gm. powder mixed with 1 cu. m. soil); brassicol [ibid., 19, p. 508] is also effective, and the seed can be sown immediately after treatment, whereas in the case of the other preparations mentioned an interval of two to three weeks is required; formalin or a 0·5 per cent. solution of the other fungicides should also be applied to the walls and windows of frames, etc. Seed disinfection should be practised, preferably with abavit-neu or ceresan-, fusariol-, and germisan-universal dusts (2gm. per kg.), or they may be used as 0·1 per cent. solutions, 15 to 30 minutes' immersion. Small foci of infection in the seed-bed should be copiously watered with 2 per cent. Bordeaux mixture or 0·25 per cent. of one of the above-mentioned fungicides, and the diseased plants removed. Other precautionary measures include sparse sowing, infrequent but thorough watering, and provision for the access of plenty of light and air.

Club root of cabbage and other crucifers (*Plasmodiophora brassicae*) may be held in check by the use of alkaline fertilizers, such as basic slag and calcium cyanamide. The soil of frames and seed-beds should be sterilized by steam or chemicals, of which the mercury-free brassisan [ibid., 21, p. 177] (50 gm. per sq. m.) is a specific for this disease. At transplanting it should be applied at a dosage of 2·5 gm. to each plant hole or strewn over the soil at 2 to 2·5 kg. per acre. *P. brassicae* is also amenable to control by the mercury-containing insecticides used against the cabbage fly [? *Phorbia brassicae*], viz., mercuric chloride, koflimate, and kortofin.

The control of *Sclerotinia sclerotiorum* on tomato, cucumber, beet, celery, and other vegetables, and of *S. minor* (mostly on lettuce) may be effected by renewal or steaming of greenhouse and seed-bed soils, while crop rotation should be practised in the field. Brassicol (40 to 50 gm. per sq. m.) has proved useful in the elimination of lettuce rot. *Botrytis cinerea* on lettuce may be combated by appropriate cultural conditions, especially reduced humidity and abundance of light and air. The treatment of *Peronospora brassicae* [*P. parasitica*] on cabbage is similar to that

recommended against the damping-off fungi, with the addition of repeated spraying or dusting with a copper-containing preparation. The incidence of *Bremia lactucae* on lettuce can be appreciably reduced by steam sterilization of the soil.

THUNG (T. H.). **Zwartrot van Kool.** [Black rot of Cabbage.]—*Landbouw*, 21, 6, pp. 259–266, 1949. [English summary.]

A tabulated account is given of experiments performed near Djokjakarta, Java, to determine the resistance to the destructive black rot (*Xanthomonas campestris*) pathogen of 23 cabbage varieties, 11 of which were discarded as susceptible after the first year (1940), while the remainder were re-tested in 1941. The most resistant varieties proved to be Cape Late Giant (36·6 per cent. diseased and 3·5 per cent. dead plants), Cape Early Drumhead (32·6 and 36·1), Cape Early Sugar Loaf (51·4 and 29·2), and Cape Yellows Resistant (29·9 and 47·9), compared with 68·3 per cent. diseased and 19·2 per cent. dead in the widely grown Roem von Enkhuizen. [This paper also appears in *Tijdschr. PlZiekt.*, 55, 3, pp. 191–195, 1949.]

MCLEAN (D. M.). **Occurrence of Sclerotinia stalk rot in Cabbage seed plants in Skagit County, Washington, in 1948.**—*Plant Dis. Reptr*, 33, 5, pp. 222–223, 1949. [Mimeographed.]

Sclerotinia sclerotiorum causes a serious stalk rot of cabbage seed plants in commercial fields every year in Skagit County, Washington. In 1948, nearly 100 per cent. infection occurred in experimental plantings, and because of this and unfavourable weather the seed yields are expected to average under 400 lb. per acre, as compared with well over 1,000 lb. in 1947.

Infection is caused by wind-blown ascospores liberated from apothecia developing from soil-borne sclerotia. Primary infections occur on the leaves or at the base of the petioles, the fungus invading the stalks from the primary foliar infections. Two seasons' observations appeared to correlate leaf infections with petal fall following pollination. Infections arise beneath the fallen petals, and precipitation during blossoming causes the falling petals to adhere to the foliage and to determine the relative severity of the disease each season. Varieties highly susceptible to *Mycosphaerella brassicicola* [*R.A.M.*, 25, p. 591] often become defoliated early in spring and are less affected by the disease than others. Crop rotation has given little control. During threshing sclerotia from infected plants are scattered on the soil. In the milling of turnip and cabbage seed sclerotia are collected in the screenings in large quantities, and many sclerotia, owing to their size, are difficult to separate from the seed in the ordinary milling operation. In two seasons, experimental dusting and spraying failed to give significant control.

STARUIGINA (MME L. P.) & SHISHELOVA (MME N. A.). Возбудители мягкой гнили семенников Капусты. [Agents of soft rot in Cabbage grown for seed.]—*Микробиология* [*Microbiology*], 17, 2, pp. 160–170, 1 pl., 1948. [Received June, 1949.]

The results of experiments carried out at the Moscow Department of the Pan-Union Institute for Agricultural Microbiology demonstrated that most of the bacteria causing soft rot in cabbage were pathogenic in varying degrees to potato tubers, carrot roots, and cabbage and potato seedlings. When grown on nutrient medium the cultures were characterized by the instability of their morphological-cultural characters (shape of colonies and cells, colour, and growth) besides the differences in pathogenicity. Many agreed with the causal organism of black leg [*Erwinia phytophthora*: *R.A.M.*, 27, p. 119], isolated from a potato stem, but the majority can be tentatively referred to as *Bacterium carotovorus* [*E. carotovora*: ibid., 28, p. 306].

Hildebrand (A. A.), McKeen (W. E.), & Koch (L. W.). **Row treatment of soil with tetramethylthiuram disulphide for control of blackroot of Sugar-beet seedlings. I. Greenhouse tests.**—*Canad. J. Res.*, Sect. C, 27, 2, pp. 23–43, 3 pl., 1949.

This is the full account of the work carried out at Harrow, Ontario, from 1946 to 1948 on the control of black root of sugar beet seedlings [cf. *R.A.M.*, 27, p. 304], which causes serious losses to stands in the south-western part of the Province. Most of the tests were carried out with naturally infested Brookston clay loam, in which the average loss of seedlings was 50 per cent., these yielding principally *Aphanomyces cochlioides* [ibid., 28, p. 263]. Exeter light sandy loam, in which seedlings invariably gave *Pythium aphanidermatum*, and a Clyde clay which gave *A. cochlioides* and *P. ultimum* in the ratio of 17:5 were also used. Uniform, segmented seed of the variety U.S. 215×216 and a standard commercial fertilizer were used in all the tests, which were carried out in wooden flats in a greenhouse. In earlier trials the fungicides under test and the fertilizer were added separately to a measured volume of soil, the former in contact with the seed (precision method), later an admixture of the two was incorporated into the top $1\frac{1}{4}$ in. of soil (surface application method). Calculations for the requisite amounts of chemical and fertilizer for the rows in the flats were made on the basis of field sugar beet rows, i.e., 23,760 linear feet of row per acre.

The performance of tetramethylthiuram disulphide (50 per cent. non-wettable) at 3 to 4 lb. per acre either in the form of arasan [loc. cit.] or D-419 (U.S. Rubber Company), but not as tersan, was consistently superior to all other materials tested in reducing pre- and post-emergence black root in all three soil types. Arasan, which was most fully investigated, retained its fungicidal properties after being mixed for 14 months with a commercial fertilizer and remained effective in the soil over relatively long periods. The correct placement of the chemical is of great importance, the best results being achieved when the seed germinated in, and the seedlings grew up through, soil impregnated with the arasan-fertilizer mixture. Up to 21° C. in a moderately wet soil, arasan was effective without causing injury. At 27° to 29° a 3 lb. application per acre resulted in a moderate injury to root and lower hypocotyl, while a 4 lb. application accentuated the injury, produced typical foliar symptoms, and increased seedlings mortality.

The other chemicals tested which showed promise were 2, 4, 5-trichlorophenyl acetate (mycotox No. 1), 20 per cent. copper trichlorophenate (C-119, Dow Chemical Company), 50 per cent. 2, 4, 5-trichlorophenyl chloroacetate (Dow F-800), and a product of undisclosed chemical composition supplied by the Dow Chemical Company, CCH-358 or 358A.

[An abstract of this paper appeared in *Proc. Canad. phytopath. Soc.*, 16, p. 16, 1949].

Ripper (W. E.), Greenslade (R. M.), & Lickerish (L. A.). **Combined chemical and biological control of insects by means of a systemic insecticide.**—*Nature, Lond.*, 163, 4151, pp. 787–789, 1949.

Systemic insecticides are carried in the sap stream of plants and make such plants poisonous to insects even in parts not reached by the spray. Three groups of insecticides with outstanding systemic action are selenium compounds, organic fluorine compounds, and organic phosphorus compounds. Experimental evidence from Pest Control Ltd., Cambridge, shows that *bis* (*bis*-dimethylamino-phosphorous)anhydride combines to an outstanding degree systemic and selective properties. The insects killed by its systemic action include a number of vectors of plant viruses.

In 1948, this insecticide was tested for the prevention of yellows virus on sugar

beet. Several tests gave some reduction in virus, and in the best, with only one application there were 64 and 18 per cent. infected plants on the unsprayed and sprayed plots, respectively. The difference in appearance between the two sets of plots was striking and it is hoped that more extensive trials will demonstrate the possibility of virus prevention.

Smith (P. G.) & Dyer (P. R.). **Results of a field test for resistance of Pea varieties to the Pea enation virus (Pea virus 1).**—*Plant Dis. Reptr*, 33, 5, pp. 219–220, 1949. [Mimeographed.]

In a test of 80 pea varieties planted near Salinas, California, for resistance to pea virus 1 (pea enation virus) [pea enation mosaic virus: *R.A.M.*, 24, p. 132; 25, p. 292] typical symptoms developed on every plant except one. Fifteen varieties including Giant Stride, Perfection, and Surprise [cf. ibid., 24, p. 132] appeared to be less affected than the others and remained fairly thrifty.

Wark (D. C.). **The treatment of Pea seed carrying bacterial blight.**—*J. Aust. Inst. agric. Sci.*, 15, 1, pp. 37–38, 41, 1949.

Samples of three lines of pea seed artificially infested with bacterial blight (*Pseudomonas pisi*) [*R.A.M.*, 27, p. 591], which has been serious in the Canberra district for some years, were steeped in various bactericidal solutions for periods ranging from five minutes to 24 hours. Two hundred seeds of each treatment were germinated on potato dextrose agar and the numbers of seeds producing cultures of pathogenic bacteria recorded. The most effective treatment was a 1 in 500 solution of mercuric chloride in 70 per cent. ethyl alcohol acidified with 3 per cent. acetic acid plus 1 in 20,000 gentian violet. Naturally contaminated Long Pod Alaska and Teton seeds, treated for four hours in the above solution and sown in the field, germinated well and the number of plants showing primary infection per 2,400 seeds was 0 and 2, respectively, compared with 45 and 80 for untreated seed.

The treatment was also effective against *P. medicaginis* var. *phaseolicola* and *Xanthomonas phaseoli* on beans [*Phaseolus vulgaris*], but is impracticable, as it causes a considerable reduction in germination.

Hare (W. W.). **Tip blight of garden Pea.**—*J. agric. Res.*, 78, 9, pp. 311–324, 5 figs., 1 graph, 1949.

Pythium ultimum [*R.A.M.*, 27, pp. 169, 344] was first reported to cause tip blight of garden peas near Madison, Wisconsin, in 1941. It was found in commercial fields of canning peas in 1942, when 40 per cent. of the plants in one field had killed tips, and again in 1943 when damage was slight. In 1946, in a nursery near Madison, an average of 6 per cent. of the plants and 10 to 15 per cent. of some lots had killed tips. One commercial field had 20 per cent. diseased plants in a 2-acre section. The same species of *Pythium* was isolated from diseased plants in all cases.

Infection takes place in the bud or the axil of a young leaf. The affected tissues are at first watersoaked with a fading of the chlorophyll, followed by desiccation when the colour changes to straw colour or black. The fungus advances downwards from the tip, rarely killing more than five internodes. Girdling occurs from the leaf axil with collapse of the node and consequent killing of the tip above it. Girdling may be incomplete with the result that a part or all of the leaf is killed and the tip of the plant survives. When a tip or leaf is killed, the progress of the lesion halts abruptly and the line of demarcation at the junction of healthy and diseased tissue is sharp. Although the fungus is not visible macroscopically on the exterior of diseased parts, a cottony web of mycelium containing fruiting bodies appears in the hollow of the stems. Diseased plants have been found ranging in maturity from those just emerged to those in blossom. In two adjacent lots differing in size, however, a greater percentage of infected plants is generally found in the shorter

plants. Symptoms identical with those found in the field were produced by artificial inoculation of young potted plants in the greenhouse, a water-soaked appearance of the tissues being evident within 24 hours. The fungus was recultured from artificially infected plants. A type of symptom not seen in the field was produced in the greenhouse by spraying the entire plant with a suspension of mycelial fragments of the fungus. After six to 24 hours in a moist chamber many small water-soaked spots that dried to a very light brownish tint, were scattered over the leaves and stems.

High relative humidity and temperatures ranging from 24° to 28° C. were most favourable for disease development. The optimum for damping-off of pea seedlings and for growth in culture was 28°. Since *P. ultimum* is an active agent of damping-off, another *Pythium*, tentatively identified as *P. debaryanum*, was tested and found to be able to cause the same type of tip blight as *P. ultimum* but with less severity.

HARE (W. W.), WALKER (J. C.), & DELWICHE (E. J.). **Inheritance of a gene for near-wilt resistance in the garden Pea.**—*J. agric. Res.*, 78, 8, pp. 239–250, 2 figs., 1949.

While screening several hundred breeding progenies for resistance to pea near wilt (*Fusarium oxysporum* f. *pisi* race 2) [*R.A.M.*, 26, p. 2] it was noted that one line (738–49) remained virtually unaffected though repeatedly resistant varieties, such as Wisconsin Perfection, succumbed. When this line was increased it continued to maintain the same resistance, and was released as Delwiche Commando [ibid., 24, p. 486]. It was derived from a cross between Pride, a near wilt susceptible variety, and a breeding line 732–66–1. The latter was an F_3 progeny from a cross between two lines of Admiral. A mass increase of 732–66–1, tested in 1938, yielded 75 per cent. resistant and 25 per cent. susceptible plants. Of seven single plants selected from the last-mentioned group tested on near wilt soil, the progeny of one contained 100 per cent. susceptible plants, and those of five segregated at ratios closely approximating 3 resistant to 1 susceptible. Three single-plant selections from the last-mentioned segregating lines segregated in the same ratio in 1940. It was evident, therefore, that near wilt resistance in 738–49 was derived from the 732–66–1 parent, and it was later found that the resistant character was controlled by a single dominant gene.

In arranging greenhouse tests for near wilt it became necessary to determine a set of controlled and easily reproducible conditions in which repeated tests could be made. The most consistent results were obtained with plants grown in sand until 2 in. high, removed for inoculation, and replanted. Dipping the roots in concentrated inoculum gave less rapid and consistent results than clipping the taproot uniformly to a length of 1 in. while the whole root was immersed in the inoculum. The most satisfactory results were secured when the sand was maintained at 21° C. With this simple greenhouse technique it was possible to differentiate individuals in segregating progenies into discontinuous near wilt resistant and near wilt susceptible classes. Field tests for this purpose are often unreliable because of the short duration of complete near wilt expression and because unfavourable environment may preclude accurate differentiation.

FENNELL (J. L.). **New Cowpeas resistant to mildew.**—*J. Hered.*, 39, 10, pp. 274–279, 2 figs., 1948.

The need for an auxiliary substitute for the bean (*Phaseolus vulgaris*) in Costa Rica appears to be best realized in the cowpea. At the Inter-American Institute of Agricultural Sciences, Turrialba, the varieties New Era, tolerant of mosaic [? a strain of cucumber mosaic virus], Sugar Crowder, and 'yardlong' (*Vigna sesquipedalis*) have proved suitable as breeding parents. Resistance to powdery mildew

(*Erysiphe polygoni*) has been obtained through crosses with 'yardlong', and crosses of these hybrids with Azul Grande produced several promising selections from which new varieties are being developed. Resistance to mildew has segregated as a multiple factor recessive. In an F_2 population of 824 mature plants, 778 showed moderate to severe infection and only 46 were comparatively free from the disease. Resistant individual plant selections from this generation yielded F_3 populations with relatively uniform resistance. These data suggest the operation of two factors for major susceptibility with one or more others concerned to a minor extent. They do not agree with those reported by Dundas [*R.A.M.*, 19, p. 60] for crosses between 'yardlong' and cowpeas, in which resistance was inherited as a simple Mendelian dominant [cf. ibid., 28, p. 42], and point to the possibility of distinct genetic strains of the fungus.

A new variety, Chinito, developed from the F_3 population × Asul Grande is highly resistant to mildew and moderately free from mosaic.

Olive (L. S.). **Target spot of Cowpea and Soybean.**—*Mycologia*, 41, 3, p. 355, 1949.

With reference to his paper on cowpea and soy-bean leaf spot caused by *Helminthosporium vignae* [*R.A.M.*, 25, p. 150], the author states that Kawamura had previously described the same organism under the name *Cercospora vignicola* [ibid., 11, p. 149] in Japan. Liu, in 1948, reported the disease in China and stated that he preferred to refer the fungus to *C. vignicola* [ibid., 28, p. 155].

The author, however, remains of the opinion that the fungus should be classified as *Helminthosporium*. In nature the conidia are typically less than ten times as long as they are broad, are brown at maturity, and the walls and septa characteristically thickened. The author proposes the following classification: *H. vignicola* (Kawamura) n. comb. (syn. *Cercospora vignicola* Kawamura; *H. vignae* Olive).

Patel (M. K.), Kulkarni (Y. S.), & Dhande (G. W.). **A new Synchytrium on Phaseolus mungo.**—*Curr. Sci.*, **18**, 5, p. 171, 1949.

Synchytrium phaseoli n. sp., the agent of a very severe foliar disease of *Phaseolus mungo* at Jalgaon, Bombay, is characterized by spherical to slightly ellipsoid, smooth sporangia, 18 to 26·6 (average 22·8) μ in diameter, with thick, dark brown walls; a spherical, olive-brown, smooth, thick-walled endospore, and an epispore 3·5 μ in thickness. The fungus covers both leaf surfaces with quadrilateral to polygonal crusts, deep brown on the upper and paler on the under side. The petioles also are occasionally attacked. The affected plants are defoliated.

Houston (B. R.) & Kendrick (J. B.). **A crater spot of Celery petioles caused by Rhizoctonia solani.**—*Phytopathology*, 39, 6, pp. 471–474, 2 figs., 1949.

A petiole crater spot of celery was found in 1947 to be fairly widely distributed in the Delta region of California. It is characterized by tan to brown, ovoid, sharply sunken lesions on the dorsal or ventral surface, often elongated 1 in. or more on the former in the direction of the long axis of the petioles. The intervenal parenchyma tissue collapses, leaving the veins as ridges through the spots. Infections occurring on rapidly elongating petioles cause scarring and often distortion of the surface tissue. *Rhizoctonia* [*Corticium*] *solani* and *Fusarium* (?) *solani* predominated among the fungi isolated from infected plants, while *Erwinia carotovora*, reported by Ark to be the agent of a crater rot of celery, closely similar to the one herein described, in the same region [*R.A.M.*, 24, p. 304], and other bacteria were also commonly present. *C. solani* was the only one of the organisms pathogenic to four-month-old Pascal celery plants in inoculation tests in sterile peat soil, isolates from beet and potato being equally virulent with those from celery. All the isolates were of the A type [ibid., 24, p. 469]. *E. carotovora* induced a rotting of celery petioles, but no typical crater spot, when inoculated through mechanical wounds

or subsequent to *C. solani* infections: in the latter case the crown tissue may be completely invaded.

Bollow (H.). **Schädlinge und Krankheiten des Spargels.** [Pests and diseases of asparagus.] *Pflanzenschutz*, 1, 9, pp. 105–108, 3 figs., 1949.

A brief account is given of the life-history of asparagus rust (*Puccinia asparagi*) [*R.A.M.*, 22, p. 510] and its effects on the crop in Bavaria, where the plants are also attacked by *Fusarium culmorum*, *Rhizoctonia violacea* [*Helicobasidium purpureum*], and *Zopfia rhizophila* [ibid., 21, p. 65]. *P. asparagi* may be combated by repeated treatments with 1 to 1·5 per cent. Bordeaux mixture plus a wetter, supplemented by drastic cutting-down and burning of the straw up to the beginning of December. *F. culmorum* is very refractory to soil disinfectants, but good results have been obtained by levelling the banks after cutting the crop.

Parris (G. K.). **Cucurbit mildews in Florida.**—*Circ. Fla agric. Exp. Stas*, S–1, 6 pp., 3 figs., 1949.

Dithane, parzate, and tribasic copper sulphate sprays give excellent control of cucurbit downy mildew (*Peronoplasmopara* [*Pseudoperonospora*] *cubensis*) and powdery mildew (*Erysiphe cichoracearum*) [*R.A.M.*, 28, pp. 7, 108, 153] in Florida. If watermelon anthracnose [*Colletotrichum lagenarium*: ibid., 28, p. 48] is present dithane and parzate are preferable to tribasic copper sulphate. With these fungicides, spraying gives better results than dusting.

To obtain the complete coverage desirable it is often necessary to spray three or more times a week. As this is expensive, growers are advised to spray or dust cucumbers with dithane, parzate, tribasic copper sulphate, or zerlate once a week for 'protective' purposes. If downy mildew becomes established, the fungicide should be applied every two or three days until it is checked. After this, fewer applications will be necessary. If foliage development is retarded by cold weather, applications will be required only once every four or five days or even only once a week.

De Carvalho (T.). **A roseta do Amendoim (Arachis virus 1—(Zim.) Smith).** [Groundnut rosette (*Arachis* virus 1 (Zim.) Smith).]—*Gaz. Agric. Moçambique*, 1, 1, pp. 10–13, 3 figs., 1949.

The following measures are advocated for the control of groundnut rosette virus, which is stated to be present in all the Mozambique plantations [*R.A.M.*, 19, p. 330] visited by the author: selection of well-shaped, medium-sized seed and its disinfection [cf. ibid., 25, p. 199] with abavit 13, agrosan GN, or ceresan (for shelled seed) or with arasan, semesan, spergon, or phygon (for unshelled); cultivation on fertile soils or the enrichment of poor ones, before sowing, with stable and green manures and chemical fertilizers; sowing at the earliest possible date [ibid., 7, p. 487; 12, p. 6] (with the commencement of the rains in late October to November) over wide areas, the rows being very closely spaced, with a uniform distance from plant to plant and row to row of 10 to 15 cm. and 60 to 80 cm. between double rows; use of the more resistant erect varieties, e.g., Philippine Pink and Philippine White, in preference to the prostrate types for late-season plantings; encirclement of the plantings with a belt of some other crop, such as maize, cassava, or French beans [*Phaseolus vulgaris*]; and triennial crop rotation.

Coutinho (M. C. P.). **Obtenção de Videiras resistentes ao míldio (início dum trabalho).** [Procurement of mildew-resistant Vines (inception of a project).] —*An. Inst. sup. Agron. Lisboa*, 14, pp. 175–183, 5 figs., 1943. [Received July, 1949.]

Work on the breeding of vines for resistance to downy mildew (*Plasmopara*

viticola) in Portugal [*R.A.M.*, 24, p. 280] is proceeding along three lines, namely, hybridization, mass selection, and clonal selection [ibid., 27, p. 218]. At the time of writing only the first-named method had yielded any results. The progeny of certain crosses, e.g., Azal branco × P.D. [direct bearer], Azal de correr × Vinhão, and Carrascanho × Tamarês, reacted to inoculation by the development of small, sterile necroses. Although most of the resistant hybrids were derived from crosses between strains of *Vitis vinifera*, their response to downy mildew was more characteristic of American than of European vines, on which the fungus normally produces large lesions covered with conidia.

Staehelin (M.). **Recherches récentes sur le rougeot parasitaire en Suisse romande.** [Recent studies on parasitic 'rotbrenner' in French Switzerland.]—*Annu. agric. Suisse*, 50, 1, pp. 69–102, 3 figs., 2 diags., 2 graphs, 1 map, 1949. [German summary.]

'Rotbrenner', an old endemic vine disease caused by *Pseudopeziza tracheiphila*, developed on an epiphytotic scale in three viticultural districts of French Switzerland between 1943 and 1947 [*R.A.M.*, 26, pp. 185, 376]. The fungus is always prevalent in seasons with a scanty rainfall, when spraying is restricted through lack of water, and over the period in question the deficit was very marked during the first four months of each year. A single wet year does not suffice to eliminate the pathogen from the infected vines. All varieties are susceptible, as well as the direct bearers.

Under local conditions the ascospores begin to ripen at the end of April, but a single heavy rainfall exceeding 15 mm. is essential for mass attacks on the young vine leaves during May. The first yellow spots appear on Chasselas foliage two to three weeks after infection, but an incubation period of five to six weeks is requisite for the development of the typical 'rotbrenner' symptoms. The occasional late infections observed probably arise from ascospores maturing only during the summer on old overwintered leaves not yet disintegrated [ibid., 26, p. 527]. In general, the attacks of *P. tracheiphila* are confined to the leaves, the peduncle seldom being invaded. The desiccation of the grapes on heavily parasitized stocks mostly results from metabolic disturbances due to the great reduction in the leaf surface.

'Rotbrenner' can be effectively combated by timely and repeated applications of a copper-containing spray, preferably 2 per cent. Bordeaux mixture [ibid., 27, p. 272] with an admixture of wettable sulphur. The leaves must be covered with a layer of copper by the time the rain liberates the ascospores.

Parris (G. K.) & Stover (L. H.). **Spraying Grapes for disease control in Florida—1945–1947.**—*Proc. Fla hort. Soc., 1947*, pp. 93–94, 1947.

In average years eight or nine fungicidal treatments at ten-day intervals are necessary for the control of the three major diseases affecting vines in Florida, namely, black rot (*Guignardia bidwellii*), bitter rot (*Melanconium fuligineum*), and ripe rot (*Glomerella cingulata*). From 1945 to 1947 in an experimental vineyard containing about 500 Florida Beacon bunch grapes, the writers followed the spraying programme recommended by Loucks [*R.A.M.*, 16, p. 17], consisting of 4–4–50 Bordeaux mixture except in the two applications immediately prior to fruit ripening, for which copper acetate is used instead. At the same time several other preparations were tested, of which the most promising were dithane-zinc sulphate-lime (2 qt.–250 g.–192 g. per 100 gals. water) and Carbide and Carbon Chemical Corporation's No 341 A (2½ lb. per 100 gals.). In 1946 the total yields of marketable fruit in the controls and dithane- and 341 A-sprayed plots were 622, 808, and 751 lb. respectively, the corresponding figures for 1947 being 252, 944, and 778 lb., respectively.

oo

Härle (A.). **Die wichtigsten Krankheiten und Schädigungen an Kulturpflanzen im Jahre 1948.** [The principal diseases and injuries of cultivated plants in the year 1948.]—*NachrBl. biol. Zent-Anst. Braunschw.*, 1, 5, pp. 63–68, 1949.

This report on the principal diseases and injuries of cultivated plants in the Anglo-American occupation zone of Germany in 1948 [cf. *R.A.M.*, 27, p. 9] follows the usual lines.

Gibson (W. H.). **Progress Report 1937–1946, Dominion Experimental Farm, Indian Head, Saskatchewan.**—60 pp., 22 figs., 1 graph, 1949.

On pp. 16–19 of this report J. G. Davidson states that Bison flax resistant to wilt [*Fusarium lini*: *R.A.M.*, 27, pp. 126, 185] has been largely displaced in the Prairie Provinces because of its susceptibility to rust [*Melampsora lini*: loc. cit.], while Royal, a high-yielding, late-maturing variety, moderately resistant to both diseases, has become the most widely grown variety. Dakota [loc. cit.], highly resistant to both, yields less than Royal, but matures earlier and more evenly.

The main weaknesses of Thatcher wheat, resistant to stem [black] rust [*Puccinia graminis*: ibid., 27, p. 554], are susceptibility to leaf [brown] rust [*P. triticina*] and a tendency for the grain to bleach. Thatcher has outyielded Marquis, Regent, and Redman [ibid., 27, p. 126]. Stewart [loc. cit.], resistant to black and brown rust, is replacing Mindum [cf. ibid., 24, p. 183], which, from 1943 to 1946, it equalled in yield.

The Ajax oat variety [ibid., 28, p. 11] has been severely attacked by race 8 of oat black rust [*P. graminis*]. Beaver has a good deal of resistance to crown rust [*P. coronata*] as well as resistance to black rust. Beacon [ibid., 27, p. 554] is resistant to black rust and to the races of crown rust so far identified in Canada. Garry [loc. cit.] is resistant to all known races of black rust and to the races of crown rust which occur in Canada, while it is also resistant to both smuts [*Ustilago avenae* and *U. kolleri*].

Stacey (E. C.). **Progress Report, 1937–1947. Dominion Experimental Station, Beaverlodge, Alberta.**—106 pp., 51 figs., 1947. [Received August, 1949.]

The following items in this report are of phytopathological interest. The barley varieties Titan and Montcalm in the Beaverlodge area have proved resistant and highly resistant, respectively, to covered smut [*Ustilago hordei*] but Montcalm is moderately susceptible to common root rot [*Helminthosporium sativum*]. Kharkov M.C. 22 is the only winter wheat variety considered suitable for production owing to its superior resistance to winter-killing.

Bunt [*Tilletia caries* and *T. foetida*: *R.A.M.*, 26, p. 540] is the only serious cereal disease present in the Peace River region, its severity having been accentuated by the large-scale production of the highly susceptible variety Red Bobs. During 1947, a severe infection of scald [*Rhynchosporium secalis*: ibid., 6, p. 272] and a light infection of *Helminthosporium* stripe [*H. gramineum*: ibid., 15, p. 288] occurred on Olli barley.

The lucerne varieties Viking and Cossack exhibit partial resistance to bacterial wilt [*Corynebacterium insidiosum*: ibid., 28, p. 442].

Recent tests have shown the raspberry varieties Madawaska, Rideau, and Trent to be superior to Herbert in flavour and they appear to be almost completely resistant to mosaic [ibid., 14, p. 642]. In winter-hardiness they are at least equal to Herbert.

Milbrath (D. G.). **Bureau of Plant Pathology.**—Ex *Rep. Dep. agric. Calif., 1948* (*Bull. Dep. Agric. Calif.* 37, 4), pp. 271–295, 1948.

In this report [cf. *R.A.M.*, 27, p. 464] G. L. Stout states that blossom inspection in 1948 disclosed 210 new cases of peach trees infected with mosaic on 26 infected

properties in San Bernardino and Riverside Counties. Leaf inspection disclosed in addition 1,108 new cases, the most since 1944, and 355 infected properties. Altogether, newly infected properties, found in Los Angeles, Riverside, and San Bernardino Counties, numbered 118 and contained 193 mosaic-infected trees. During the nine years that test plots for peach stocks have been in operation many new varieties of the hosts subject to peach mosaic (mostly peach) have been indexed for freedom from the virus.

Surveys of orange plantings carried out by G. L. Stout and R. L. McClain have shown quick decline [ibid., 28, p. 62] to be present only in Los Angeles, Orange, and San Bernardino Counties. There has been a large increase in the number of diseased trees, many orchards having become so seriously affected that they have been removed. In November, 1948, a major extension and modification of the quarantine boundaries was made to conform to the latest survey findings. Although less than 1 per cent. of all the orange trees in the State are actually affected, 47·5 per cent. of the acreage is now in the quarantined area.

G. L. Stout reports that no cases of Pierce's disease of vine [lucerne dwarf virus: ibid., 27, p. 217] were observed during inspections covering half the vine acreage in Alameda County, but 1,013 diseased vines were found on 59 infected properties in Napa County. They were removed under the supervision of the commissioner.

Lemon dry bark [ibid., 27, p. 519] is of particular economic importance in the parts of Santa Barbara and Ventura Counties, within ten miles of the sea. Lemon collapse or collapse decline [ibid., 26, p. 147] has been occurring in several plantings in these counties. Affected trees commonly wilt and collapse suddenly while still green and in full foliage. The condition occurs in the Eureka variety on grapefruit rootstock and affects trees ranging from 8 to 12 years old. It is reported (abs. in *Phytopathology*, 38, p. 918, 1948) that necrosis of the sieve tubes just above the bud union occurred as an early symptom in lemon trees on grapefruit stocks that subsequently declined. Collapsed trees are found usually in winter and early spring. They may die when seriously affected but in many cases they recover to a certain extent. The use of budwood or scions from affected trees or from plantings containing collapsed trees should be avoided.

During October, *Phymatotrichum omnivorum* was found in lucerne in four scattered locations.

Cherry rusty mottle [ibid., 25, p. 385] was found for the first time in California in several San Joaquin County orchards. Since some of the affected trees were at least 20 years old, the disease may have been present for at least several years. Some trees, however, were only a few years old with a history strongly indicating some spread through the medium of nursery stock.

An inspection of all chestnut trees in the three plantings in San Joaquin County known to contain *Endothia parasitica* [ibid., 28, p. 200] revealed two infected trees in each of two plantings and a single tree in the third, indicating a gradual diminution in the amount of disease in these plantings.

During 1947, necrotic fleck [cucumber mosaic virus + ? lily symptomless virus: ibid., 28, p. 174] was found in a field of Easter lilies (*Lilium longiflorum*) in Alameda County, the first record of the disease in the State.

Mallamaire (A.). **Note sur quelques insectes parasites et sur quelques maladies des plantes cultivées dans les terres irriguées de l'Office du Niger (Soudan français).** [Notes on some parasitic insects and on some diseases of cultivated plants in the irrigated areas of the Office of the Niger (French Sudan).]—*Coton Fibres trop.*, 4, 1, pp. 19–24, 4 figs., 1 map, 1949.

Plant diseases observed in the irrigated areas of Niono, Foibougou, Siengo, and Kouyakoro (French Sudan) on an official visit in December, 1942, included leaf spot (*Mycosphaerella areola*) and physiological shedding [*R.A.M.*, 26, p. 200] of

cotton, *Tolyposporium penicillariae* [loc. cit.] on *Pennisetum spicatum*, and *Sphacelotheca sorghi* on sorghum.

Instituto Agropecuario Nacional. Una Estación Experimental Agrícola Cooperativa para el mutuo beneficio de los habitantes de Guatemala, Estados Unidos de América y demás Repúblicas de la América Latina. Trabajos llevados a cabo durante el año 1947. [Instituto Agropecuario Nacional. A Co-operative Agricultural Experiment Station for the mutual benefit of the people of Guatemala, the United States of America, and other Republics of Latin America. Work carried out during the year 1947.]—42 pp., 1 graph, 1947. [Mimeographed. Received 1949.]

On pp. 31–36 of this report it is stated that in February, 1947, a species of *Corticium* was found to be attacking nursery coffee in Chicacao, Guatemala. Sanitation and ventilation were recommended to control the disease. A species of *Fusarium* was the cause of wilting of several trees in a coffee plantation at Villa Canales.

During March, Messrs. Keilhauer Pagram & Co. reported that a collar rot disease was causing severe reductions in the yield of citronella [*Cymbopogon nardus*] at Escuintla. Bordeaux mixture applied in October by Myers and Hardie motor sprayers proved effective in controlling the disease.

An inspection of a sub-station at Quezaltenango revealed that the wheat was healthy on the whole, with only a few scattered cases of loose smut [*Ustilago tritici*: *R.A.M.*, 28, p. 12]. A small proportion of loose smut [*U. nuda*: ibid., 21, p. 518] was also found on barley. Losses from loose smut on oats [*U. avenae*: ibid., 28, p. 57] amounted to 25 per cent.

Anderson (T. F.). **The reactions of bacterial viruses with their host cells.**—*Bot. Rev.*, 15, 7, pp. 464–505, 3 pl., 1949.

The author discusses the nature of the virus problem in bacteria, the general properties of the bacterial viruses [*R.A.M.*, 28, p. 56], their formation and adsorption, and the biological composition and development of the virus-host complex, and reviews virus genetics.

Newhall (A. G.). **Technical and scientific developments.**—*Cacao Inf. Bull.*, 1, 3, 4 pp., 1948. [Mimeographed. Received June, 1949.]

At the Inter-American Institute of Agricultural Sciences, Turrialba, Costa Rica, spraying six-week-old cacao seedlings with a fresh sporangial suspension of *Phytophthora faberi* [*P. palmivora*: *R.A.M.*, 28, pp. 278, 385, and next abstract] resulted in infection of 100 per cent. of the seedlings and the death of 90 per cent. within three or four weeks, thus indicating a method of eliminating susceptible seedlings in large numbers. Cultures on groundnut shells plus 1 per cent. dextrose developed abundant viable sporangia for inoculum and cultures on cacao pods were equally satisfactory. The relationship between the susceptibility of seedlings and pods has not yet been definitely established.

Newhall (A. G.). **Research at Turrialba on Cacao diseases.** —*Cacao Inf. Bull.*, 1, 7, 7 pp., 1948. [Mimeographed. Received July, 1949.]

In Costa Rica, cacao [black] pod rot (*Phytophthora palmivora*) [see preceding abstract] causes greater loss of marketable crop than all other cacao diseases combined. It is estimated that in many plantations 50 per cent. of the pods were lost through the disease between 1st September and 31st December, 1947. Pods of all sizes were attacked at any point, and the fungus was isolated also from the embryos of seeds in affected pods, from the blackened tips of wilted chupons, from cankers on twigs, and from soil beneath old trees.

Pods inoculated with spores or cultures of *P. palmivora* became infected in eight or ten days. Sporangia developed on pods in damp chambers five days after inoculation, and ten of 14 healthy pods became infected in five or ten days when placed on moist, naturally infected soil in the laboratory. Water suspensions of sporangia from diseased pods caused infection of the growing tips of young *Hevea* rubber twigs.

Slide tests indicated that copper fungicides were much the most effective in inhibiting germination of sporangia and of those tested Bordeaux (2–2–50) was the most effective. In one non-replicated test of seven fungicides sprayed on to 180 seedlings which were inoculated the next day the best protectants were parzate (2 lb. per 100 gals.), tribasic (4 lb.), and yellow cuprocide (1½ lb.); Bordeaux (2–2–50) was less effective.

Using green or ripe inoculated pods in moist chambers it was possible to obtain a fresh crop of viable sporangia in 24 hours; one pod can serve as a source of inoculum for a week. It was calculated that an average-sized pod can give rise to from 5,000,000 to 10,000,000 sporangia, each of which may contain 20 to 25 zoospores able to infect pods, leaves, or chupons in a few hours in the presence of a thin film of moisture. If less than 0·01 per cent. find an infection court, hundreds of infections may be initiated by one diseased pod. Fungicidal treatment is, therefore, probably cheaper and more effective than pod removal.

Anthracnose pod rot due to *Colletotrichum theobromicola* [cf. ibid., **26**, p. 383; **28**, p. 31] and [brown] pod rot or, better, dry sooty rot (*Diplodia* [*Botryodiplodia*] *theobromae*) [ibid., **27**, p. 226; **28**, p. 8] are common. In spore-germination tests *B. theobromae* was effectively inhibited by Bordeaux mixture (2–2–50), phygon, zerlate, yellow cuprocide, and fermate. Good cultural practices, which include pruning and spraying against *P. palmivora*, will probably eliminate this disease.

C. theobromicola, besides attacking pods of all sizes, causes a good deal of leaf spotting and dry marginal burning. It has been isolated repeatedly from fruits, leaves, and twigs, and when spores are sprayed on to seedlings, the young leaves two weeks later show small, dark brown, circular spots, lesions on the veins, and marginal necrosis.

Cacao seedlings are subject to stem rots, apparently of soil origin. Brown lesions occur at or below the soil line, sometimes causing stunting or even death. From these lesions a *Rhizoctonia*, a *Fusarium*, and a fungus producing black pycnidia were isolated. A preliminary test indicated that a soil application of fermate (1 gm. per sq. ft.) may give control. Other minor diseases include a root rot, due perhaps to a *Rosellinia*; a pod rot, found once at La Lola, caused by a dark, grey green fungus producing black pycnidia containing oval, sub-hyaline, unicellular spores; and thread blight (*Corticium koleroga*) [ibid., **14**, p. 87; **26**, p. 334].

Phytophthora pod rot of Cacao.—*Cacao Inf. Bull.*, 1, 16, p. 1; 18, pp. 4, 5; 19, p. 7, 1949.

According to M. S. Hernández the cacao losses caused by pod rot (*Phytophthora palmivora*) in Nicaragua [*R.A.M.*, **28**, p. 277 and preceding abstracts] may exceed 50 per cent. of the harvest, with a minimum of 30 per cent. in dry weather.

Field and laboratory experiments showed that the disease is spread by drops of water falling on infected pods and splashing on to sound ones. The elimination of dead infected pods has proved ineffective [cf. ibid., **11**, pp. 701, 702] since the spores are not disseminated by air. The application of Bordeaux mixture provides the most effective method of control.

Dr. A. G. Newhall has prepared an annotated bibliography of all the more important papers on the *Phytophthora* pod rot of cacao, and of the *Phytophthora* spp. attacking rubber, coconuts, and other tropical plants, obtained mostly from Vols. 1–27 of this *Review*.

G. F. Bowman states that it is intended to develop the laboratory method for evaluating resistance to *P. palmivora*. Inoculated pods from resistant clones kept in a moist chamber became discoloured more slowly than those from susceptible ones.

Bowman (G. F.). **Cacao centre chief reports on Gold Coast industry.**—*Cacao Inf. Bull.*, 1, 18, pp. 1–2, 1949.

In a report to the Director of the Inter-American Institute at Turrialba, Costa Rica, the author describes his impressions of a visit to the Gold Coast late in 1948 when he inspected some of the cacao-producing areas ravaged by swollen shoot disease.

Guppy (Ethel). **Minutes of meetings. Monthly general meeting.**—*Proc. agric. Soc. Trin. Tob.*, 48, 2, pp. 89–95, 1948.

On 15th April, 1948, members of the Trinidad and Tobago Agricultural Society visited the cacao experimental plots and propagating station at Marper where Dr. E. Phillis explained the Government's Cocoa Rehabilitation scheme in connexion with cacao witches' broom [*Marasmius perniciosus*: *R.A.M.*, 28, p. 162]. In the early years when control by cutting and spraying proved unpromising, the search for immune plants, some of which had been reported from Surinam and Ecuador, was intensified and a number of trees conspicuously free from the disease were found in Trinidad. The Marper Estate of some 110 acres was acquired and devoted entirely to the control of witches' broom. Buds and seedlings from resistant Trinidad trees were grown at Marper. None, however, proved immune, though some were very resistant, but not sufficiently so to be propagated for general distribution.

Following a survey of Ecuador in 1933 [ibid., 13, p. 359] Dr. Pound collected seeds there in 1937 [ibid., 17, p. 801; 19, p. 391]. These were planted at Marper and revealed a wide range of susceptibility. In all, some 2,500 clones were established.

The 32 clones from resistant buds brought from Amazon territory in 1943 [ibid., 24, p. 140] are still under test, some showing a few brooms, others appearing immune. Where the Department was satisfied that the parent trees were highly resistant cuttings were propagated and interplanted with cuttings of susceptible varieties. To obtain reliable data on quality and yield of individual trees, resistant clones were planted in acre blocks on half a dozen sites in Trinidad. At present these clones are being propagated at the rate of 2,000 a month and it was expected that by the end of 1948 the figure would be 5,000. In 1949 a few cuttings would be available for general distribution and by 1950 hundreds of thousands should be possible.

Dillon Weston (W. A. R.). **Diseases of cereals.**—x +69 pp., 14 figs., 11 diags., London, Longmans, Green & Co. Ltd., 1948. 4*s.* net.

This booklet, intended for farmers and agricultural students, contains simple accounts of the cause, symptoms, life-cycle, spread, and means of control of the principal diseases and disorders affecting wheat, oats, barley, and rye in England.

Andrén (F.). **Resultat av 1947–48 års betningsförsök i stråsad.** [The result of cereal seed-grain disinfection experiments in the year 1947–48.]—*Växtskyddsnotiser, Växtskyddsanst., Stockh.*, *1949*, 1, pp. 6–11, 1949.

In the 1947–8 cereal seed-grain disinfection experiments at the Stockholm Plant Protection Institute [*R.A.M.*, 28, p. 9], the number of plants attacked by wheat bunt [*Tilletia caries* and *T. foetida*] was reduced from 481 to 0·6 per 10 sq. m. [not 1 sq. m. as given in error in previous abstract: loc. cit.] by uspulun dust U.T.

1875b (200 gm. per 100 kg.) and panogen (200 ml.). The other mercurials were also reasonably effective, though abavit dust (200 gm.) permitted an incidence of 9·9 diseased plants per 10 sq. m., the corresponding figures for the non-mercury-containing phygon, cuproxide, and spergon (all at 200 gm.) being 2·6, 3·1, and 11·7, respectively. There was no significant difference between the various preparations in the yield increases produced.

The winter rye seed was again naturally contaminated by snow mould (*Fusarium*) [*Calonectria nivalis*] to the extent of 70 per cent. On an average the best results were given by panogen, betoxin 61 (200 gm.), aagrano (200 gm.), and U.T. 1875b.

Most of the preparations tested against barley stripe [*Helminthosporium gramineum*] reduced the number of diseased plants from 55·3 to less than one per 10 sq. m. They included, besides those already mentioned, betoxin F (200 ml.), agrosan GN, lunasan, and certosan (all at 200 gm.).

Aagrano, panogen, betoxin F, betoxin 61, and lunasan proved superior to all the other fungicides tested for the control of loose smut of oats [*Ustilago avenae*], reducing the number of diseased plants (average of four experiments) from 20·7 to 0·2, 0·7, 0·2, and 0·7 per 10 sq. m., respectively.

Macindoe (S. L.). **The nature and inheritance of resistance to stem rust of Wheat, Puccinia graminis tritici, possessed by several resistant parents.**—*Sci. Bull. Dep. Agric. N.S.W.* 69, 112 pp., 32 pl., 1948 (issued 1949).

A full account is given of investigations to discover additional sources of resistance to wheat stem [black] rust (*Puccinia graminis*) [*R.A.M.*, 28, p. 387], to ascertain the nature of this resistance in a few instances, and to trace the mode of inheritance in crosses with certain susceptible varieties. In the course of the work, 70 wheat varieties, chiefly with field resistance to black rust in Australia, and crosses made at Glen Innes, Australia, in 1938 were grown in America, the F_1 seed of Australian grown wheat at St. Paul, Minnesota, F_2 seed at Winnipeg, Canada, and F_3 seed in Arizona; United States parental seed was mostly of Australian origin.

The results showed, in artificial epidemics using 32 races of the rust, that varieties susceptible in the field in Australia were susceptible in the field in North America. Varieties resistant in Australia fell into three groups: (A) those resistant at both St. Paul and Winnipeg, which mostly possessed the mature-plant resistance of Hope, H-44, or Thatcher; Red Egyptian S979 also came into this category; (B) varieties resistant at Winnipeg, but only moderately resistant or even moderately susceptible at St. Paul, including many Kenya lines, McMurachy, and Gaza × $Bobin_2$, with, apparently, high physiologic resistance to many races; (C) varieties susceptible at both Winnipeg and St. Paul including some only moderately susceptible in Australia and others such as Eureka, which before 1941 was highly resistant in Australia where 34 is the prevalent race.

On a basis of their reaction to seedling, needle, and chamber inoculations in the greenhouse, resistant varieties were classified as possessing either 'physiologic' or 'mature-plant' resistance. The former were resistant to most of the races by inoculation and also in the field. They included Charter, Gaza × $Bobin_2$, Egypt NA, and Fedweb 1. Charter, especially, and Gaza × $Bobin_2$, were resistant in the seedling stage to 23 of 25 races used. Varieties with mature-plant resistance only included Hofed 1, Hope × (Currawa × Dundee), Hope × Gandilla King, Thatcher Minn. 2303, Thatcher Selection, and, to a less extent, Acme × Waratah and Marquillo × Waratah. Thatcher and its selection also possessed very high physiologic resistance to races 17 and 19, which, in the case of Thatcher Selection, amounted to immunity in needle inoculation tests. In all cases where resistant parents, such as Charter, Gaza × $Bobin_2$, and Egypt NA, exhibited physiologic resistance to race 34, it was found that the field and seedling segregations showed close association and usually inheritance was relatively simple and apparently controlled by

the same factor or factors. Families with seedling resistance showed, however, some differences in degree of field resistance. Final selections, therefore, should be made in the field. Seedling and field resistance in Charter × Winter Minflor crosses were governed by a single pair of factors. The same was true with Eureka as the susceptible parent, provided seedling tests were made at 70° to 80° F.

In crosses of Charter with Seafoam, Carrabin, and K 33, resistance to a group of physiologic races was controlled by a single pair of factors under field conditions, and the same pair conditioned reaction to race 34 in the seedling stage. When Gaza × $Bobin_2$ was crossed with both Eureka and Pusa 111, a single major factor pair governed resistance to race 34 both in the field and, at normal temperatures, in the seedling stage.

With all the F_1 plants tested the resistant factor or factors in Charter and Gaza × $Bobin_2$ were dominant in the seedling stage at 70° to 80°. In the field, however, F_1 plants were intermediate in black rust reaction or, in one case, susceptible. Internodes of F_1 plants from Charter × Eureka were susceptible to race 34, though seedling and later leaves of the same plants simultaneously inoculated showed highly resistant pustules.

On the basis of F_2 field data only, a single recessive factor appeared to govern black rust resistance in crosses of Fedweb 1 with Eureka and Winter Minflor.

In the crosses Charter × Winter Minflor, Charter × Eureka, and (Gaza × $Bobin_2$) × Eureka, resistance at normal temperatures to races 15, 17, 19, 34, 36, 56, and UFA 197 appeared to be controlled by one genetic factor pair. The same factor pair in each cross governs resistance to race 19, and Charter and Gaza × $Bobin_2$ appear to possess at least one additional factor responsible for resistance to race 19 and susceptibility to the other seven races. In the cross (Gaza × $Bobin_2$) × Eureka only one such additional factor pair for resistance to race 19 was present.

In the crosses Charter × Eureka and (Gaza × $Bobin_2$) × Eureka the inheritance of seedling reactions to race 34 at about 60° was controlled by a factor additional and non-allelic to that determining resistance at normal temperatures. This additional factor appeared to be contributed by the Eureka parent, which itself became resistant at the lower temperature.

From F_2 field reactions it appeared that a single factor controlled field resistance to leaf [brown] rust [*Puccinia triticina*] in crosses between Charter and the resistant varieties Argentine, Uruguay, and K 33. There was no evidence of association between this character and field or seedling reaction to black rust race 34.

Klingman (D. L.). **Wheat varieties for Wyoming.**—*Bull. Wyo. agric. Exp. Sta.* 282, 27 pp., 2 figs., 3 graphs, 1948. [Received August, 1949.]

Among the spring wheat varieties recommended for Wyoming, based on crop value figures for 1934–43, are Pilot (C.I. 11,945), derived from Hope × Ceres and resistant to stem [black] rust [*Puccinia graminis*: *R.A.M.*, 27, p. 126], leaf [brown] rust [*P. triticina*: loc. cit.], and bunt [*Tilletia caries*: ibid., 27, p. 511], and Onas (C.I. 6,221), although susceptible to black rust and bunt. The winter wheat Nebred (C.I. 10,094) [ibid., 28, p. 451] is highly resistant to many races of bunt and is somewhat tolerant of black rust.

Klingman (D. L.). **Barley varieties for Wyoming.**—*Bull. Wyo. agric. Exp. Sta.* 283, 20 pp., 1 fig., 2 graphs, 1948. [Received August, 1949.]

The following barley varieties are recommended for irrigated land in Wyoming. Frontier (C.I. 5461) from a composite cross, released in 1946, is outstanding and resists loose smut [*Ustilago nuda*: *R.A.M.*, 27, p. 15], while Lico, although susceptible to it, is a very good yielder. Velvon is highly resistant to covered smut [*U. hordei*: ibid., 28, p. 389], but is susceptible to loose smut. Trebi resists loose smut [loc. cit.], but is susceptible to covered smut and [leaf] stripe [*Helminthosporium*

gramineum: loc. cit.]. For dry land, Compana [ibid., 24, p. 311], Spartan, with excellent quality feeding grain but susceptible to both smuts, and Beecher [loc. cit.], recommended particularly for south-east Wyoming although susceptible to loose smut, are suggested. Glacier [loc. cit.], resistant to covered smut but susceptible to loose smut, Horn [loc. cit.], and Gem, susceptible to loose smut, are acceptable but recommendation is withheld pending further tests.

KLINGMAN (D. L.). **Varieties of Oats for Wyoming.**—*Bull. Wyo. agric. Exp. Sta.* 284, 23 pp., 1 fig., 1 map, 1 graph, 1948. [Received August, 1949.]

Bannock (C.I. 2592), a high-yielding midseason oat variety resistant to smut [*Ustilago avenae* and *U. kolleri*: *R.A.M.*, 27, p. 180], derived from Markton [ibid., 25, p. 554] × Victory, and also Overland (C.I. 4181), which is resistant to smut and many races of stem [black] rust [*Puccinia graminis*: ibid., 28, p. 440] but susceptible to *Helminthosporium* [*victoriae*: ibid., 28, pp. 11, 14], are recommended for cultivation on irrigated soils in Wyoming. Markton and Brunker [ibid., 25, p. 554], both smut-resistant, are recommended for dry-land soils. Acceptable smut-resistant varieties tested include Bridger (C.I. 2611), Carleton (C.I. 2378), a good yielder on both irrigated and dry soils, and Mission (C.I. 2588) [loc. cit.], which shows great promise.

NICHOLSON (G.). **Oat and Barley varieties recommended for 1949 sowing.**—*Agric. Gaz. N.S.W.*, 60, 2, pp. 70–72, 1949.

The varieties of oats and barley recommended for 1949 sowing in the various districts of New South Wales are listed together with notes on the qualities of the former and their reaction to diseases. Algerian and Sunrise are moderately resistant and resistant, respectively, to leaf [crown] rust [*Puccinia coronata*; *R.A.M.*, 18, p. 239], but the former is susceptible to smut [*Ustilago kolleri* and *U. avenae*: ibid., 25, p. 296] and stem [black] rust [*P. graminis*: ibid., 18, p. 656]. Brigalow and Guyra have some resistance to smut but are both susceptible to rust. Of the newer varieties Alber is fairly resistant to smut and crown rust but susceptible to stem rust while Ballidu and Dale show resistance to smut but are susceptible to crown and stem rust. Klein 69 B has good resistance to crown rust and some resistance to stem rust and on this account may prove useful in coastal areas.

DUPIAS (G.). **Une Urédinée hétéroxène nouvelle parasite du Seigle.** [A new heteroecious rust parasitic on Rye.]—*Bull. Soc. mycol. Fr.*, 64, 3–4, pp. 180–186, 7 figs., 1 graph, 1948.

A full description is given of *Puccinia clematidis-secalis* n.sp., the aecidial state of which occurs in France on *Clematis vitalba*. Inoculations with the aecidiospores on various Graminae resulted in infection only on rye. The teleutospores so produced infected *C. vitalba*, with the development of aecidia. The pycnia are often surrounded by aecidia measuring 260 to 400 μ in diameter on lesions 2 to 13 mm. in diameter. The peridium consists of irregularly polyhedric cells which measure 25·to 35 by 20 to 25 μ. The subglobose or ellipsoidal aecidiospores measure 23·5 to 30 by 20·7 to 25 (average, 26 by 23) μ; they have a hyaline wall 1 to 1·5 μ thick, which is finely and densely verrucose and orange-coloured inside. The sparse, oblong, orange-yellow uredosori measure 0·3 to 1 mm. in length and rapidly become pulverulent. The globose, subglobose, or ellipsoidal uredospores, produced as a result of inoculation, measure 23 to 27·5 by 20 to 25·5 μ, have a pale, rather thickly echinulate epispore with 3 to 6 pores and no projecting papillae. The teleutosori measure 150 to 300 by 100 to 200 μ. The oblong or claviform, rounded teleutospores, conical-obtuse or truncated at the apex, not constricted or little constricted at the septum and tapering at the base measure 30 to 52 (average 41) μ in length, the upper cell being 12·5 to 22·5 by 16·2 to 22·5 (average, 18·8 by 18·5) μ

and the lower 14 to 28·7 by 12·5 to 18 (average 22 by 16) μ. The brown, smooth epispore thickens to 5 μ at the summit, where it is darker. The short pedicel is yellowish-brown. It is distinguished from *P. dispersa* by its shorter teleutospores.

GASSNER (G.). **Zur Methodik der Beizmittelprüfung auf Schneeschimmel.** [On the technique of testing disinfectants for snow mould.]—*NachrBl. biol. Zent-Anst. Braunschw.*, 1, 6, pp. 77–78, 2 figs., 1949.

The following method has been found superior to the one in current use in Germany for the testing of plant-protectives against snow mould [of rye and other cereals: *Calonectria nivalis*]. Each experimental box is converted into a moist chamber by means of a glass lid and panes inserted at the front, back, and sides. The temperature should be maintained at about 5° C. Inspections should be made every eight to ten days, the infected plants being removed and the holes closed with fresh garden soil. The duration of the tests should be about eight to ten weeks. Not only does this technique expedite the appearance of the pathogen, but it is appreciably less laborious than Winkelmann's method (*Mitt. biol. Anst. (Reichsanst.) Berl.*, 3, p. 18), involving the use of separate glass tubes for each seed.

HILDEBRAND (E. M.). **Baldulus maidis, leafhopper vector of Corn stunt virus, in Texas.**—Abs. in *Phytopathology*, 39, 6, pp. 496–497, 1949.

Within four days of their colonization by adult, light-coloured leafhoppers (*Baldulus maidis*) collected near Weslaco, Texas, small, caged maize plants developed stunt symptoms of the 'wilt-blight', necrotic type [*R.A.M.*, 26, p. 52], which were not induced by darker-coloured individuals of the same species. The affected plants survived on the prompt removal of the leafhoppers. The adult-to-adult leafhopper generation period ranged from 18 to 24 days. The minimum incubation interval between feeding on diseased maize and actual transmission was about 24 days.

SMITH (F. L.) & MADSEN (CATHARINE B.). **Susceptibility of inbred lines of Corn to Fusarium ear rot.**—*Agron. J.*, 41, 8, pp. 347–348, 1949.

Maize ear rot (*Fusarium moniliforme*) [*Gibberella fujikuroi*: *R.A.M.*, 25, p. 406 *et passim*] is a serious disease in California, where it is becoming more destructive with the influx of hybrids from the maize belt. Of 60 inbred lines of dent maize tested in 1948 for their reaction to the pathogen, none proved immune and many were highly susceptible. The most resistant were Illinois L, R4, R61, 4221 [4211 in table], Indiana Kys, 33–16, WF_9, Iowa Ite 701, Os 426, Kansas K 55, Kentucky Ky 58, Ky 27, Ky 39, Nebraska N 6, U.S.D.A.C.I. 3 A, and C.I. 540, with rot scores (in a gradation from 1, representing a trace of infection, to 6, implying complete destruction) ranging from 1 to 1·7. The scores for 13 California flint lines ranged from 1 to 2·8. The local open-pollinated variety, King Philip Hybrid, seldom shows more than a trace of rot at the tip of the ear.

STEVENS (N. E.). **Fluctuations in losses from Milo disease on grain Sorghums at Chillicothe, Texas, 1938–1947.**—*Agron. J.*, 41, 8, pp. 394, 1949.

In a further examination of the figures supplied by Quinby and Karper for the losses caused by milo disease [*Periconia circinata*] in sorghum grain crops over an eight- to ten-year period at Chillicothe, Texas [*R.A.M.*, 28, p. 331], the percentages of yield reduction due to the fungus in the susceptible as compared with the resistant strains were computed at 32 for 1938, 63 for 1939, 100 for 1940, 55 for 1941, 59 for 1942, 65 for 1943, 4 for 1944, 2 for 1945 and 1946, and 34 for 1947. Expressed in bushels per acre the average differences in favour of the resistant strains were 13·9 in 1938, 11·6 in 1939, 7 in 1940, 13·1 in 1941, 17·7 in 1942, 29·2 in 1943, 0·9 in 1944, 0·8 in 1945, 0·3 in 1946, and 10·2 in 1947.

Fraser (Lilian). **A gummosis disease of Citrus in relation to its environment.**—*Proc. Linn. Soc. N.S.W.*, 74, 1–2, pp. v–xix, 1949.

In this Presidential address to the Linnean Society of New South Wales the author describes the characters of *Phytophthora citrophthora* [*R.A.M.*, 27, p. 70] and the symptoms it causes in citrus, outlines the history of the distribution of the various kinds of citrus and the origin and spread of the disease [I.M.I. Map No. 35] and discusses the present distribution of the major disease phases in New South Wales, the part played by environmental factors in influencing disease development, and the variation in susceptibility exhibited by the different species. The fungus appears to be without specialized strains. The following groupings were obtained by inoculation experiments on potted seedlings and on trees about 15 years old: lemon and sweet lime (very susceptible); sweet orange, rough lemon, and grapefruit (moderately susceptible); Cleopatra tangerine (intermediate); Sampson tangelo, Thornton tangelo, and sour orange (fairly resistant); citremon (resistant); and Carrezo citrange and *Poncirus trifoliata* (immune) [cf. ibid., 24, p. 92; 28, p. 213]. The resistance of the last-named has shown no signs of breaking down in the many experiments performed and its field immunity has been confirmed by many observations in New South Wales and Victoria.

Plant diseases. Septoria spot of Citrus fruit.—*Agric. Gaz. N.S.W.*, 60, 2, pp. 85–87, 6 figs., 1949.

Septoria spot of citrus caused by *S. depressa* [*R.A.M.*, 28, p. 453] occurs only in the south-western part of New South Wales, periodically causing heavy losses in the Murrumbidgee Irrigation Areas and the Upper Murray region. It has never been recorded on the coast.

The symptoms appear in the winter, the development of the spots being nearly always associated with a certain amount of frosting. Its development slows up with the onset of warmer weather and ceases altogether during September. The fungus flourishes freely on twigs and fruit pedicels and on dead wood in and under the tree. Here numerous spores are produced; these infect the fruit in late autumn and early winter, probably in May and June, and possibly throughout the winter.

A single application of Bordeaux 2½–2½–100 plus ½ gal. white oil in mid-March gives full control. A weaker spray consisting of Bordeaux 1–1–100 plus ½ gal. white oil or copper oxychloride (1 lb. per 100 gals.) plus ½ gal. white oil are recommended for growers who fear scale build-up. The *Septoria* spot spray may also be combined with zinc spray (plus ½ per cent. white oil) for the control of mottle leaf [ibid., 25, p. 66]. Sprays containing 2½ per cent. oil should not be applied later than March.

Vanselow (A. P.) & Datta (N. P.). **Molybdenum deficiency of the Citrus plant.**—*Soil Sci.*, 67, 5, pp. 363–375, 4 figs., 1949.

Rooted Eureka lemon cuttings grown for 15 months in solution cultures without molybdenum developed characteristic symptoms of foliar mottling and necrosis when the original content of the element had been attenuated by transfer to, and utilization by, the new growth. No cultures supplied with molybdenum developed symptoms of any kind. The molybdenum content of the dry matter of young leaves of the deficient plants was 0·01 p.p.m., that of the foliage of plants in cultures supplied with 0·001 p.p.m. of the element was 0·2 to 0·3 p.p.m., and that of plants just beginning to show mottling 0·024 p.p.m. The molybdenum deficiency symptoms were quickly eliminated by the addition of 0·01 p.p.m. molybdenum to the culture solutions, while even in the presence of amounts as low as 0·0001 p.p.m. the plants recovered in a few months. The deficiency was also rapidly and easily overcome by spraying small quantities of a soluble molybdenum compound on the

foliage, only a small portion of which had to be treated to cure the entire plant. The deficiency symptoms developed in the absence of molybdenum even when the plants were well supplied with nitrogen in the form of ammonium salts.

Ciferri (R.) & Ciccarone (A.). **Observaciones sobre la enfermedad de la 'hoja bronceado' del Cocotero en Venezuela.** [Observations on the 'bronze leaf' disease of the Coco-nut in Venezuela.]—*Rev. Fac. Agron. Medellín*, 9, 33, pp. 17–26, 3 figs., 1949.

Bronze leaf wilt has been observed in the coco-nut plantations all along the coast of Venezuela, on the north and south coasts of the Dominican Republic, and possibly on the south coast of Cuba. The symptoms of the disease, as it occurs in Venezuela, are fully described and compared with those developing in Trinidad [*R.A.M.*, 17, p. 390], Jamaica [ibid., 24, p. 367], and the Dominican Republic (where it was encountered by the senior author in 1925 but not differentiated from similar disorders of obscure origin). The Venezuelan wilt has features in common with both the Trinidad and Jamaican forms, while in other respects it is intermediate between the two; there are also analogies between the symptoms observed in Venezuela and the Dominican Republic, though in the latter country the approximation to the Jamaican aspect is definitely more marked. Bronze leaf wilt is believed to have been present in Venezuela at least since 1910 to 1914; the country harbours a number of foci of very considerable intensity.

According to Leach the 'unknown' coco-nut disease in Jamaica is quite distinct from the Trinidad bronze leaf wilt [ibid., 26, p. 53], and in that case the two maladies would be co-existent in Venezuela and presumably also in the Dominican Republic. For the present, however, the authors incline to the theory that there is only one disease of the kind in Venezuela, its different 'facets' being due to diverse environmental (mainly edaphic and climatic) factors, as well as to individual variations in productivity and adaptability.

Thomas (K. M.). **Coffee research. Short notes on some diseases and pests of Coffee.** —*Mon. Bull. Indian Coffee Bd*, 12, 6, pp. 5–6, 1948.

Spread of coffee leaf disease (*Hemileia vastatrix*) [*R.A.M.*, 27, p. 419] can be controlled in south India by timely applications of Bordeaux mixture (2–2–40) before the arrival of the south-west and north-east monsoon rains. The control given by spraying has sometimes increased yields by 50 to 100 per cent. [cf. ibid., 19, p. 700]. Four races of the fungus have been identified [ibid., 25, p. 448], and work at the Research Station, Balehonnur, has resulted in the development of strains of Arabica coffee resistant to the four races.

Black rot (*Corticium koleroga*) [ibid., 13, p. 230] prevails in the region of the Western Ghats and at higher altitudes, and is very common in sheltered situations, where the atmosphere is humid. The disease starts with the south-west monsoon rains.

The term 'jelloo' denotes beans or fruits that come out as 'floaters' [cf. ibid., 26, p. 199] during pulping. Either or both beans in a fruit may be 'jelloo'. The condition has been attributed to faulty pollination, incomplete or faulty fertilization, defective development, resulting in partly developed beans or beans with endosperm but no embryo, or 'black jelloo', which is a case of black bean [ibid., 18, p. 105; cf. 26, p. 233]. A high percentage of 'jelloo' is commonly encountered among hybrids, especially those of Robusta × Arabica.

Balasubrahmanyan (R.) & Raghavan (A). **Bacterial blight on Cotton in Madras.** —*Cott. Pests & Dis. Pap., Indian cent. Cott. Comm.*, 4, 5 pp., [1949.]

In India, incidence of cotton blackarm (*Xanthomonas malvacearum*) [*R.A.M.*, 28, p. 15] is confined to parts of Madras where the eco-climatic conditions normally

favour its development. In 1945, the crop in most of the areas receiving intermittent heavy rains developed heavy infection with considerable resultant reduction in total production. Severe incidence and losses occurred where the new strain Co3 (Co2 × Uganda 4/4) was grown on both irrigated and unirrigated areas. Breeding for resistance had to be included in the breeding programme.

The first two years' work (using the secondary infection method) [ibid., 25, pp. 448, 499; 28, p. 171] proved that (*a*) Madras American cottons differed in resistance; (*b*) among the cultivated strains pure line selection 920 and a hybrid strain Co3 (Co2 × Uganda 4/4) were the most susceptible, followed in order by Co2 (a pure line) and 4463 (Co2 × Uganda 4/4), while the most resistant was Co4 (Co2 × A 12); (*c*) all except Co4 failed to respond to re-selection; and (*d*) it was found possible to develop a resistant secondary selection Co4/B40–21 and to build up a high resistance in the derivatives of hybrids from resistant parents. Corroborative evidence of the resistance of Co4/B40–21 was obtained from growers in a year of optimum environmental conditions for large-scale secondary infection, when the local variety suffered from both leaf fall and stem attack, though the new substrain showed only mild leaf spot. The secondary infection method was also helpful in grading progeny derived from crosses with susceptible parents such as Co3, and was indispensable in eliminating weak biotypes in the early stages.

Experimental evidence supported the view that differential biological races of the organism do exist [cf. loc. cit] and that the Indian races can break the resistance of B_2B_3 types [ibid., 27, p. 474] singly or severally unless strengthened by the addition of major or minor genes from the acclimatized Madras Uplands. Uganda B31 tested under conditions of natural field infection behaved similarly and reached a grade of susceptibility equal to Co3, but the resistance of BAR 2–7 was on a par with Co4/B40–21. This difference is not explicable except on the assumption that BAR types differ in a major or minor genic complex, this becoming apparent only under Indian conditions and upon impact with new races of the organism.

Blank (L. M.). **Breeding for resistance to bacterial blight of Cotton.**—Abs. in *Phytopathology*, 39, 6, pp. 494–495, 1949.

The Stoneville 20 strain of cotton has been used as the blight [blackarm: *Xanthomonas malvacearum*] resistant parent in a number of crosses with susceptible varieties and breeding strains of cotton [*R.A.M.*, 28, p. 172]. The resultant progenies were carried through the F_3 generation or back-crossed twice to the recurrent susceptible variety or strain, selfed, and tested for reaction to the disease. Inoculation of the breeding material in field plantings was effected by spraying the lower leaf surfaces of five- to eight-week-old plants with a suspension of the organism, and grading for disease reaction was made 15 to 20 days later. The lesions of resistant phenotypes are fewer and smaller than those of susceptible ones. F_1 offspring of the susceptible cross were susceptible, while the F_2 progenies segregated at a ratio approximating 3:1 for susceptibility and resistance. The approximation was closest in crosses involving highly susceptible varieties like Acala and less so in those with considerable natural tolerance. Progenies derived from selfing after one and two back-crosses yielded populations pure for susceptibility or segregating, the latter consisting of susceptible and resistant plants in a 3:1 ratio. These data indicate that the Stoneville 20 type of resistance to blackarm is inherited as a single factor, with resistance recessive to susceptibility.

Brinkerhoff (L. A.). **Hypodermic injection as a method of inoculating Cotton plants with Verticillium albo-atrum.**—Abs. in *Phytopathology*, 39, 6, p. 495, 1949.

In California and Arizona it is rare for more than 15 to 30 per cent. of a susceptible cotton population to show symptoms of *Verticillium* wilt (*V. albo-atrum*) at the

opening of the selfing season, in either naturally or artificially infested soil. Thus, in breeding for resistance to the disease [*R.A.M.*, 22, p. 385] much time may be lost in selfing plants that subsequently prove susceptible. Hypodermic injection and wound inoculation both produced high percentages of infection in young field-grown plants in 1947 and 1948, but the former method was much the more rapid, being about equal to soil infestation in this respect. A veterinary syringe with a No. 24 needle was used to inject about $\frac{1}{4}$ ml. inoculum just below soil-level into the hypocotyl of seedlings with two to four true leaves. Within three weeks symptoms developed on 99 per cent. of the plants of the susceptible variety Acala 1–23–11, and 98 per cent. on those of the tolerant Missdel × Acala 10–13, the latter suffering much less severely than the former and comprising a far higher percentage of recoveries.

Abrahão (J.) & Costa (A. S.). **Instruções para o reconhecimento da 'ramulose' do Algodeiro.** [Instructions for the recognition of Cotton 'ramulosis'.]—*Biológico*, 15, 3, pp. 59–60, 1 pl., 1949.

A description is given of the symptoms of cotton 'ramulosis' (an extreme form of anthracnose caused by *Colletotrichum gossypii* var. *cephalosporioides*) [*R.A.M.*, 26, pp. 219, 333], which has now been reported from Pernambuco, Parahyba, Rio Grande do Norte, and Pará, as well as from São Paulo, Brazil, causing reductions in yield ranging from 30 to 70 per cent. A number of commercial varieties with adequate resistance to ramulosis are at present available.

Sen (J.). **On the occurrence of Cordyceps sphecocephala (Kl.) Sacc. near Calcutta.**—*Curr. Sci.*, 18, 7, pp. 254–255, 1 fig., 1949.

So far only two species of *Cordyceps* have been recorded from India by Butler and Bisby [*R.A.M.*, 11, p. 545], namely, *C. falcata* and *C. racemosa* from the Khasi Hills. A third species, *C. sphecocephala*, has now been collected on *Pompilus* sp. near Calcutta. A description of the fungus is given.

Gomosis del Henequen. [Gummosis of Sisal.]—*Sisal de Yucatan*, 9, 106, pp. 14–16, 3 figs., 1948. [Abs. in *Coton Fibres trop.*, 4, 2, p. 34, 1949.]

A new disease has made its appearance in the sisal plantations of Yucatan [Mexico]. The leaves shrivel and turn yellow and reddish and a viscous substance is present in more or less abundance. Under favourable conditions infection spreads rapidly, foliar desiccation ensues, and the fibre becomes worthless. The gummosis, evidently of bacterial origin, may be combated by burning all the diseased material and making new plantations with sufficiently wide spacing to obviate contact between the plants.

Fisher (F.). **The preservation of hard fibres against mould and fungoid growth.**—*Fibres, Fabrics & Cordage*, 15, 10, pp. 331–332, 1948.

The acyl derivatives of pentachlorophenol, consisting of complex combinations of organic acids, e.g. acetic, stearic, and lauric, with the phenol itself, are stated to possess the same degree of toxicity to moulds as the pure chemical without its tendency to leach out. Lauryl pentachlorophenol, for instance, is a waxy, colourless substance which can be incorporated in both water and oil and oil in water emulsions, as well as in organic solvents. This fact is of definite importance to the rope and cordage industry because of the possibility of incorporating in the finished emulsion both water- and rot-proofing properties. Pentachlorophenol is toxic to *Trametes serialis* at 10 p.p.m., to *Hormiscium gelatinosum* [*R.A.M.*, 27, p. 546], *Poria incrassata*, *Lenzites trabea*, and U. 10 (Bell Telephone Laboratories) [cf. ibid., 25, p. 589] at 20, to *Rhizopus nigricans* [*R. stolonifer*] at 40, to *Chaetomium globosum* at 60, and to *Aspergillus niger* at 80 p.p.m.

Butler (F. C.). **Zinc deficiency of Linseed.**—*Agric. Gaz. N.S.W.*, 60, 2, p. 84, 1949.

During a recent survey of linseed crops in the Boggabri district of New South Wales many were observed to be dwarfed and showed a 'club head' arrangement of the bolls which were all on approximately the same level. Some of the shoots had died back and the middle and upper leaves were bronze in colour. The symptoms appeared to be those associated with zinc deficiency [*R.A.M.*, 28, p. 215] and similar to those reported on flax in Victoria [ibid., 25, p. 342]. The soils in this district have an alkaline reaction. In one paddock where a coil of galvanized wire was lying the surrounding linseed plants were normal.

Schmidt (Trude). **Die Botrytis-Fäule der Gladiolenknollen, eine für Österreich neue Krankheit.** [The *Botrytis* rot of *Gladiolus* corms, a new disease for Austria.]—*PflSch. Ber. Wien*, 3, 7–8, pp. 97–111, 8 figs., 1949. [English summary.]

The causal organism of a corm rot of *Gladiolus*, herein fully described for the first time from Austria, was identified as *Botrytis gladiolorum* [*R.A.M.*, 28, p. 399], which is likewise responsible for the same disease in Australia, England, and Holland. The strict specialization of the fungus on its own host, already reported Timmermans [ibid., 25, p. 501], was confirmed by cross-inoculation experiments.

D'Oliveira (B.). **Life-cycle of Puccinia gladioli Cast.**—*Nature, Lond.*, 164, 4162, pp. 239–240, 1949.

Inoculations made at the National Agronomic Station, Sacavem, Portugal, with aecidiospores of a rust from *Valerianella discoidea* and *V. carinata* on leaves of potted *Gladiolus segetum* plants, gave rise after ten days to yellow pustules which became dark brown and eventually black with the development of teleutosori of *Puccinia gladioli* [*R.A.M.*, 12, p. 469]. Further inoculations confirmed that the gametophytic stage of this rust occurs on *Valerianella* spp. and the teleutophase on wild *Gladiolus* spp.

Parievskaya (Mme A. P.). Вирусное заболевание декоративных растений (мозаичное заболевание **Pelargonium sp.**). [A virus disease of ornamental plants (mosaic disease of *Pelargonium* sp.)]—*Микробиология* [*Microbiology*], 17, 5, pp. 376–379, 2 figs., 1948.

Geraniums in floricultural farms in U.S.S.R. were found to be affected with three types of mosaic [*R.A.M.*, 20, p. 304], the numbers of infected plants varying from 1·1 to 9·8 per cent. Leaf crinkling was present in all three types. The laminae of plants showing type 1 had pale and dark green spots and pale green spotting along the veins. At the end of June the symptoms became masked; at the beginning of August small, round yellow spots with dark green centres appeared also in old leaves; young leaves became slightly wrinkled. In type 2 the leaves showed small, bright yellow spots (sometimes ring-shaped) which later coalesced into larger, diffuse, irregular areas. The symptoms disappeared at the end of June. Type 3 showed the whole lamina covered with small yellow spots. Later larger, bright yellow rings with yellow centres developed, and ultimately vivid yellow spotting appeared between the ring-shaped spots.

The results of experiments showed that the disease can be transmitted by grafting, but not by sap inoculations [loc. cit.]. The symptoms on the infected Meteor variety agreed with those caused by *Pelargonium* virus 1 [pelargonium leaf curl virus], but there were some differences from those described by Pape [ibid., 11, p. 245]. It is suggested that the plants were possibly infected with two viruses, one causing leaf curl, and the other mosaic of different types.

Green (D. E.) & Hewlett (M. A.). **Two diseases of Lachenalia glaucina. (1) A bulb rot caused by a species of Fusarium, (2) a leaf spot caused by Mystrosporium adustum.**—*J.R. hort. Soc.*, 74, 5, pp. 211–215, 2 figs., 1949.

Two diseases of *Lachenalia glaucina*, a basal rot and a leaf spot, have occasionally been noted at the Wisley laboratory. With basal rot growth ceases when the leaves are an inch or two high and the young plants have an unhealthy appearance. The root system is found to have rotted away and the base of the bulb is brown or blackish-brown, the discoloration often extending half-way up each side of the bulb. In some cases, the mother bulb is almost completely destroyed, only thin, 'glassy' leaves arising from offsets near the base; these contract the disease and the mother bulb is destroyed. The condition is associated with a *Fusarium* with sickle-shaped, two-to six-septate spores measuring 16 to 50 by 3·5 to 6 (average of 100, 30 by 4) μ.

The leaf spot appears as small, fiery brown lesions which slowly enlarge, making the leaf surface uneven. When an affected leaf is kept in a warm, moist atmosphere, the spots produce a dark green growth of spores. The leaves are eventually killed, generally after flowering. The causal organism was identified as *Mystrosporium adustum* [*R.A.M.*, 17, p. 797]. Inoculations of wounded and unwounded *L. glaucina* leaves caused the appearance of typical spots in four or five days and about a week, respectively. Inoculation of wounded and unwounded *Iris reticulata* bulbs gave a black lesion resembling that shown by ink disease due to *M. adustum*.

Ekstrand (H.). **Näringsförhållandena och vallgräsens övervintring.** [Nutritional relations and the overwintering of pasture grasses.]—*Växtskyddsnotiser, Växtskyddsanst., Stockh.*, 1949, 2, pp. 5–9, 1949.

Particulars are given of a number of observations and experiments in northern Sweden in 1947–8 which clearly demonstrated the increased resistance to the overwintering fungi, *Sclerotinia borealis* and *Typhula borealis* [*R.A.M.*, 28, p. 279], conferred on pasture grasses, including timothy [*Phleum pratense*], by the use of phosphate fertilizers [ibid., 27, p. 416].

Thirumalachar (M. J.) & Narasimhan (M. J.). **Preliminary note on the heteroecism of Puccinia versicolor.**—*Curr. Sci.*, 18, 7, pp. 252–253, 1949.

Puccinia versicolor is a common leaf rust of spear grass (*Heteropogon contortus*), which is widely distributed in Mysore, forming an important grass of dry pasture lands. Cultural studies of the parasite indicated that it is heteroecious, with *Plectronia parviflora* [*Canthium parviflorum*] (Rubiaceae) as its alternate host.

The yellowish-white, pulverulent, erumpent uredosori appear during July and August, and secondary infection by the uredospores leads to a rapid spread of the rust. The teleutosori begin to develop in January, originating as dark specks among the yellowish-white uredosori, and may be collected in abundance during April and May. At this time no viable uredospores could be collected in the vicinity of Bangalore, so that the rust evidently does not oversummer in the uredo stage. The teleutospores were germinated in large numbers. The promycelium is external and quadricellular, bearing globular, hyaline sporidia which germinate *in situ*.

Intensive field studies covering several seasons showed that the uredo stage of *Puccinia versicolor* first appeared on clumps of spear grass growing close to *Canthium parviflorum*, a widely distributed thorny shrub on dry waste ground. Teleutospores from spear grass were germinated and the sporidia inoculated into young leaves of *C. parviflorum* grown under rust-free conditions. Pycnidia developed after eight days and were soon followed by aecidia. The aecidiospores were reinoculated into spear grass and gave rise to aecidia in the course of 12 to 18 days.

Patel (M. K.). **Xanthomonas desmodii, a new bacterial leaf-spot of Desmodium diffusum DC.**—*Curr. Sci.*, 18, 6, p. 213, 1949.

Xanthomonas desmodii n.sp., which produces on the lower leaf surfaces of *Desmodium diffusum* (a green manure) at Poona yellowish-brown, watersoaked, angular spots, resulting in defoliation, is a short rod, occurring singly or in pairs, motile by a polar flagellum, non-spore-forming, Gram-negative, and strictly aerobic. On neutral potato dextrose agar the colonies are circular, viscid, smooth, wet, and amber-yellow with colourless margins. The minimum, optimum, and maximum growth temperatures are 11°, 25° to 30°, and 38° C., with a thermal death point at 50°. Gelatin is liquefied, starch hydrolysed, casein digested, litmus milk reduced, and milk peptonized. Hydrogen sulphide is produced in small amounts, but no ammonia or nitrites; asparagine is not utilized, blood serum not liquefied, and no growth made in Fermi's, Uschinsky's, or Cohn's solutions. Acid but no gas is produced in the presence of dextrose, galactose, lactose, mannite, maltose, and sucrose.

Smith (O. F.). **Diseases of Alfalfa in Nevada and their influence on choice of varieties.**—*Bull. Nev. agric. Exp. Sta.* 182, 28 pp., 10 figs., 2 graphs, 1948.

Bacterial wilt (*Corynebacterium insidiosum*) [*R.A.M.*, 27, p. 466; and above p. 562], the most destructive lucerne disease in Nevada, occurs in practically all well-irrigated parts of the State. The only means of control is the use of resistant varieties. Cool, wet weather favours the development of bacterial stem blight (*Phytomonas* [*Pseudomonas*] *medicaginis*) [ibid., 22, p. 420] in the central and northern areas. Early harvest of heavily infected fields is recommended, the subsequent new growth being usually free from the disease. Root rot, due to *Phymatotrichum omnivorum* [ibid., 12, p. 515] causes considerable crop losses in southern areas. Severely damaged stands should be ploughed and the area planted with other crops not susceptible to the organism, e.g., small grains. Other lucerne diseases of minor importance are crown wart (*Urophlyctis alfalfae*) [ibid., 27, p. 96], downy mildew (*Peronospora trifoliorum*) [ibid., 27, p. 283], black stem (*Ascochyta imperfecta*) [ibid., 28, p. 293], leaf spot (*Pseudopeziza medicaginis*) [ibid., 27, p. 24], and yellow leaf blotch (*P. jonesii*) [ibid., 17, p. 325].

Preston (D. A.). **Bacterial canker of Cowpeas.**—*Bull. Okla. agric. Exp. Sta.* B–334, 11 pp., 2 figs., 1 map, 1949.

Bacterial canker (*Xanthomonas vignicola*) [*R.A.M.*, 23, pp. 468, 469], the most serious disease of cowpeas in Oklahoma, occurs in 37 counties and is suspected in others. Further reports have come from Alabama, Florida, Georgia, Illinois, Louisiana, Mississippi, and South Carolina. Chinese Red, widely grown in Oklahoma, is especially susceptible and threatened with extinction.

During the blight phase, watersoaked spots ranging in size from a pin point to nearly ½ in. in diameter appear on the cotyledons and first leaves of young seedlings, turning reddish-brown and eventually pale yellow-brown. The spots enlarge and cover half or more of the surface of the older leaves. Severely blighted leaves usually drop. The pods may be distorted and have raised or swollen, reddish-brown spots and poor seed development. The characteristic stem cankers usually occur on older plants, but are sometimes found on seedlings and young plants; which consequently become stunted and mostly die before reaching maturity. Severely cankered stems often break just above the crown. The author found typical canker and leaf blight symptoms also on naturally infected catjang pea (*Vigna cylindrica*) and asparagus bean (*V. sesquipedalis*).

As the pathogen is carried within the seed, various seed treatments proved ineffective. To control the disease the use of resistant varieties is recommended,

especially, in addition to those already mentioned [loc. cit.], the high-yielding Brabham, Arlington, and New Era, and also Blue Goose and Holstein.

Experiments showed that buried infected plant material is the source of infection; the pathogen remained viable in the debris for two years and then caused infection of healthy plants. Thus cowpeas should be omitted from a rotation for this period at least. Wind-driven rain and dew are important factors in spreading the disease in the field. In tests the disease was transmitted by watering healthy plants with a hard spray directed through the infected cowpeas. Although there is no experimental evidence, it is suggested that certain insects may also spread the disease.

Atkinson (J. D.) & Chamberlain (E. E.). **Apple-mosaic in New Zealand.**—*N.Z. J. Sci. Tech.*, A, 30, 1, pp. 1–4, 5 figs., 1948. [Received August, 1949.]

Apple mosaic [*R.A.M.*, 28, p. 512] has been found in the five chief apple-growing areas of New Zealand, i.e., Auckland, Hawkes Bay, Nelson, Canterbury, and Central Otago. It occurs also at Te Hana, Te Puke, Tinopai, Tuakau, and Warkworth, and in Wellington Province at Levin and Masterton. In one Nelson orchard every one of 80 mature Jonathan trees showed infection. In three blocks of Dougherty and six of Granny Smith near Auckland 60 to 80 per cent. of the trees were infected, though very few leaves per tree showed mottling. In three blocks of Golden Delicious all the trees examined showed mosaic, with a high percentage of affected leaves. In two small blocks of Jonathan raised from clonal buds every tree was infected, the number of mottled leaves and the severity of the symptoms varying widely.

Seedlings of Jonathan, Sturmer, Pippin, and Granny Smith apples grew well and remained free from virus. Infected budwood from shoots with marked symptoms was used for budding healthy seedlings in March 1946; symptoms appeared on scions and seedling stocks in six weeks from the beginning of spring growth. Only 19 of 36 buds grew, but 26 of the seedlings developed mosaic symptoms, while 38 controls remained healthy.

Kessler (H.). **Hautbräune, ein gefährlicher Feind unseres Lagerobstes.** [Scald, a serious disease of our stored fruit.]—*Schweiz. Z. Obst- u. Weinb.*, 57, 19, pp. 318–322; 21, pp. 363–365, 2 figs., 1 graph, 1949.

In connexion with the increase in damage from scald among stored apples in Switzerland [*R.A.M.*, 13, p. 582; 20, p. 538; 21, p. 457] during the last three years, the available information on the disease and its control is summarized from the relevant literature.

Fischer (H.). **Der Gitterrost der Birnbäume und seine Bekämpfung.** [The lattice rust of Pear trees and its control.]—*Schweiz. Z. Obst- u. Weinb.*, 57, 21, pp. 359–362, 3 figs., 1949.

The life-history of *Gymnosporangium sabinae*, which produces its aecidia and pycnidia on pear and its teleuto stage on junipers [*R.A.M.*, 28, p. 404], is described in semi-popular terms. In Switzerland *Juniperus sabina*, *J. virginiana*, *J. chinensis*, and various less common species serve as hosts of the teleuto stage. The likelihood of transmission of the rust from its alternate hosts to pears diminishes with increasing distance from a radius of about 30 m. round the focus of infection, until at 200 to 300 m. the risk becomes negligible. The economic importance of the disease is inconsiderable unless a large proportion of the leaves are attacked, in which case the reduction in the area of assimilation leads to a check in growth and fruit-setting. Total extermination of infected junipers (compulsory in certain cantons) is the sole effective means of control.

Refatti (E.). **Su di una grave malattia dei Peri nelle provincie di Trento e Bolzano.** [On a serious Pear disease in the provinces of Trento and Bolzano.]—Reprinted from *Ric. sci.*, 18, 7, 5 pp., 4 figs., 1948.

Pears in the provinces of Trento and Bolzano, Italy, have been affected for about 40 years by a serious decline [*R.A.M.*, 27, p. 530] of undetermined etiology. At first sporadic and confined, for the most part, to the Val d'Adige, the disease began to spread in 1942; in that year 2,000 affected trees were found, while by 1947 the figure had risen to 50,000. The [? total] loss involved is estimated at present at 800,000,000 lire. Early varieties are most affected, including Muscatel, William, Diels Beurré, and occasionally Bonne Louise d'Avrenches and others. Most of the diseased trees are 10 to 20 years old.

Appearance in a grove is gradual; here and there a tree looks less vigorous than the others, with smaller development of woody branches, smaller leaves of a less vivid green, and a greater production of fruit spurs. Only part of a tree may be affected, in which case the leaves fall prematurely, this being preceded by pronounced heterophylly. In winter the first stage is difficult to detect, but the cambium shows isolated, reddish-brown spots. When growth is renewed affected trees flower abundantly but the inflorescences are weakly and incompletely developed, especially the terminal ones. If the disease progresses slowly, some of the fruits abort, while the ones reaching maturity are small and tasteless. In spring, the leaders of some trees in an early stage of the disease begin to produce shoots but growth is suddenly arrested, the shoot then withering and turning brown. The lower region of the branch develops adventitious shoots (to become affected in their turn) or chlorotic leaves.

The symptoms become more marked in the second year. The tips of some branches are dead with the bark and the underlying tissues generally turgid and intensely black, while the woody cylinder is dark. The branches and parts of branches still alive are walnut to reddish-yellow or ferruginous. The spots in the cambium are more numerous. The next spring numerous flowers form but wither. The leaves are small and the apex lobed, or they are rolled; they are brittle and poor in chlorophyll; many fall and the branch withers.

In the fourth year the tree does not shoot but sometimes branches grow at the base bearing a few flowers and rosettes of leaves. During the year the tree dies.

Recently, however, the progress of the disease has become much more rapid. While the plants first attacked undergo gradual decline, other trees in the orchard begin to wilt. The affected trees often occur in clumps of four or five or more, but sometimes there is only a single affected tree. The roots appear normal except for slight production of absorbing rootlets, but in an advanced stage of the disease they are dying, progress of the condition being centripetal, as in the aerial parts. There is degeneration of the cambium amounting to necrosis, proliferation inwards is arrested, with retardation of activity towards the outside, the hypertrophied cells differentiating only partially. These processes also occur in parts that appear under the lens to be healthy.

No specific organism could be isolated from affected material. Work is in progress to ascertain whether the condition is of virus origin, or whether it may be due to nutritional factors.

Biraghi (A.). **Su di un' anomalia nella lignificazione di noccioli di Albicocca.** [An abnormal lignification of Apricot stones.]—*Ann. Sper. agr.*, N.S., 3, 1, pp. 143–147, 3 figs., 1949. [English summary.]

A description is given of an abnormality observed since 1946 in the cells of the stones of apricots sold in Rome; lignification fails to develop in certain parts and causes the stones to be perforated. Whitish areas develop on the surface of the

stone, and the symptoms bear some resemblance to a similar condition of apricots in Bulgaria attributed to a virus disease [plum pox: *R.A.M.*, 14, p. 642; 27, p. 27].

Miller (P. W.). **Studies on the cause of Strawberry root rot in Oregon.**—*Rep. Ore. St. hort. Soc., 1948*, pp. 35–38, 1949.

Further studies on the cause of strawberry root rot in Oregon revealed that besides the three recognized types of rot [*R.A.M.*, 27, p. 571], namely, red core (*Phytophthora fragariae*), brown root rot, and black root rot (due to desiccation of the roots during digging and planting), lack of aeration and a high water table under greenhouse conditions will produce a type of black root that affects both the core and the cortex. A constantly maintained high soil moisture content did not cause root rot, however, if the drainage was good. Lack of aeration and possibly the formation of toxic substances would appear to be responsible for the condition, rather than a high soil moisture content.

Baker (R. E.). **Growing Strawberries in the home garden.**—*Circ. Calif. agric. Ext. Serv.* 151, 15 pp., 6 figs., 1949.

In this circular, intended for the home gardener in California, the disease reactions of the following recommended strawberry varieties are given. Sierra is resistant to yellows [yellow edge virus: *R.A.M.*, 28, p. 69] and *Verticillium* wilt [*V. albo-atrum*: ibid., 28, p. 342]; Lassen is resistant to yellow edge [ibid., 27, p. 373]; Shasta [loc. cit.], Donner, Tahoe [loc. cit.], Twentieth Century (Utah Everbearer), Blakemore, and Missionary are moderately resistant to yellow edge, and Klondike slightly so. Banner and Rockhill are resistant to *V. albo-atrum*, but susceptible to yellow edge. Powdery mildew [*Sphaerotheca humuli*: ibid., 27, p. 430] is commonly present in the coastal areas. Saline injury, to which the Lassen, Donner, and Blakemore varieties are fairly resistant, occurs chiefly in southern California.

Zentmyer (G. A.). **Avocado wilt.**—*Calif. Citrogr.*, 34, 7, pp. 316–317, 3 figs., 1949.

Avocado wilt, due to *Verticillium albo-atrum* [*R.A.M.*, 28, p. 343], occurs in the five principal avocado-producing counties in Southern California during December, January, June, and July; at present the disease is of no great economic importance, as usually only one or two trees in a grove (ranging from $2\frac{1}{2}$ to 20 years) are affected.

It is suggested avocado trees should not be planted on land recently cropped with tomatoes or other plants highly susceptible to the pathogen, nor young groves interplanted with susceptible crops. Diseased trees as sources of budwood, graftwood, and seed should be avoided; if the disease is recurrent affected trees should be removed and the soil fumigated with chloropicrin.

Macfarlane (Miss C. S.). **Avocado blemish : a distal-end spot of Avocado fruits.**—*Fmg S. Afr.*, 24, 276, pp. 205–206, 2 figs., 1949.

In 1946, the author received from Western Cape Province avocado fruits with blemishes caused by *Pseudomonas syringae* [*R.A.M.*, 26, p. 457]. In South Africa the symptoms of this disease appear only on the fruits, on which small black spots develop, sometimes with a hard outer surface which tends to develop star-shaped cracks. These spots coalesce and produce a large, black blemish at the distal end. If the weather is warm and heavy rains occur just before picking, the black areas may crack, allowing entry to secondary rot organisms. The blemish itself, however, is superficial, and does not affect the flesh except immediately below the darkened

area, but it renders the fruit very unsightly. Varieties so far affected are Gottfried, Nabal, and, to a less extent, Fuerte.

Locally, spraying with Bordeaux mixture (4–4–50) has given satisfactory results. The first application should be made about four months before picking, or whenever the first spots appear. The trees should be examined after warm, rainy conditions (which favour infection) and spraying started at once if there is any sign of the disease. With Fuerte, probably the most popular variety, the average time to begin spraying would be the end of May.

Viney (R.). **Commercial orchard spraying equipment.**—*N.Z. J. Agric.*, 78, 5, pp. 509–511, 3 figs., 1949.

The author briefly describes the three standard types of spraying equipment in use in commercial orchards in New Zealand, viz., stationary, portable, and crawler outfits, and notes the advantages and disadvantages of each. One grower has imported an air blast sprayer [cf. *R.A.M.*, 26, p. 348] from America. Drawn by a tractor and operated by the driver, this machine has a capacity of 450 gals., fills in 2½ minutes, and empties in 8 minutes with all jets working; the sprayer is operated by a 100 h.p. motor.

Wain (R. L.). **Recent advances in the study of fungicides and insecticides.**—Reprinted from *Agric. Progr.*, 23, 1, 6 pp., 1 graph, 1948. [Received August, 1949.]

The author gives a survey of the lethal properties and modes of action of the copper fungicides and chlorinated synthetic insecticides.

Brown (C. C. A.) & Golding (E. W.). **The application of electricity to horticulture.** *J. Instn elect. Engrs*, 95, 2, pp. 423–433, 15 figs., 1948.

This paper contains, *inter alia*, descriptions of electrode- and immersion-type soil sterilizers, recommended both for amateur and commercial use, and of electrically heated water baths for bulb and plant treatment.

Jewell (W. R.). **List of fungicides, insecticides, vermin destroyers and weed destroyers registered at the office of the Director of Agriculture under the Fungicides Act 1935 (No. 4295) for the year 1949.**—*J. Dep. Agric. Vict.*, 47, 6, pp. 274–287, 1949.

This tabulated list, which covers nearly 500 brands registered for sale in Victoria during 1949, includes many long established materials as well as some newer compounds. The products are arranged in classes according to the chemical composition with the percentage of declared active constituent of each and the address of the wholesale dealer.

Directory of collections of micro-organisms maintained in the United Kingdom and Crown Colonies.—Issue No 1 of the British Commonwealth Collections of Micro-organisms, 27 pp., 1949. [Mimeographed.]

In this catalogue the collections are listed alphabetically under the names of the towns in which the laboratories or institutions are situated, commercial laboratories being listed under the name of the firm and institutions in the London postal area under their own names. Under each entry is given the name of the keeper of the collection, the type of organism maintained and approximate number of species, and the method of distribution of the cultures. Each entry also bears a code number under which they are indexed at the end of the publication. There is an index to the types of micro-organisms and opposite each appear the code numbers of the laboratories where collections of them may be found. It is hoped

at a later date to issue a list of the genera and species kept in the collections named in this Directory.

The Directory is free on request from the Secretary, United Kingdom National Committee of the British Commonwealth Collections of Micro-organisms, 38 Old Queen Street, London, S.W. 1.

WHITEHOUSE (H. L. K.). **Multiple-allelomorph heterothallism in the fungi.**—*New Phytol.*, 48, 2, pp. 212–244, 2 graphs, 1949.

An historical survey is given of the study of multiple-allelomorph heterothallism in Hymenomycetes (including the Tremellales) and Gasteromycetes. Published data for 230 species of the former indicate that approximately 10 per cent. of the species are homothallic, 35 per cent. heterothallic and bipolar (with one locus), and 55 per cent. heterothallic and tetrapolar (with two loci). Fruit-bodies of the Hymenomycetes and Gasteromycetes usually have two allelomorphs at each locus for heterothallism, and apparently arise from a single cell containing a pair of nuclei of different mating types. A method is described for estimating the number of allelomorphs at the loci for heterothallism, and a list of recorded homothallic and of bipolar and tetrapolar heterothallic species is appended. Four pages of references are given.

KAVANAGH (F.), HERVEY (ANNETTE), & ROBBINS (W. J.). **Antibiotic substances from Basidiomycetes. iv. Marasmius conigenus.**—*Proc. nat. Acad. Sci., Wash.*, 35, 7, pp. 343–349, 1949.

In further studies of the antibacterial activity of Basidiomycetes [*R.A.M.*, 26, p. 462; 27, p. 252] a white crystalline substance, named marasmic acid, with antibacterial activity was isolated from the culture liquid of *Marasmius conigenus*. Its antifungal activity (given as the minimum inhibiting concentration in μgm. per ml., *p* representing partial inhibition) developed against ten test fungi was: *Aspergillus niger* 32 (16 *p*), *Chaetomium globosum* 64, *Gliomastix convoluta* 250 (8–128 *p*), *Memnoniella echinata* 64, *Myrothecium verrucaria* 64, *Penicillium notatum* 32 (16 *p*), *Phycomyces blakesleeanus* (+ strain) 16 (8*p*), *Saccharomyces cerevisiae* 32, *Stemphylium consortiale* 128 (64 *p*), and *Trichophyton mentagrophytes* 4.

PINTO-LOPES (J.). **An attempt to explain the differences of antibiotic power in the different isolations of the same species of the Hymenomycetes.**—*Portug. Acta biol.*, 2, 3, pp. 149–166, 1948.

A comparison of the results of experiments carried out by Hervey [*R.A.M.*, 27, p. 252] and by the author [ibid., 26, p. 504] demonstrates that under identical conditions polysporic mycelia of the same species of Hymenomycete, although from different sources, show the same antibiotic activity. When cultures, received under the same specific name, exhibited differences in antibiotic behaviour, either their determination proved to be wrong or the mycelia were of a different nuclear structure. Both the monosporic and polysporic cultures of a species should be tested for their antibiotic activity, as the behaviour of the two forms is not necessarily identical.

It is suggested that the antibiotic behaviour may be a valuable factor in distinguishing closely related species and that its genetic basis should be determined.

CULLER (DOROTHY), BROWN (H. D.), & WILSON (MILDRED). **The effect of fungi on the flavour and colour of Tomato juice.**—*Ohio J. Sci.*, 49, 3, pp. 97–101, 1949.

Experiments were carried out at the Ohio State University, Columbus, to determine the effect of 28 moulds and yeasts including *Rhizopus nigricans* [*R. stolonifer*],

Rhizoctonia sp., *Fusarium* sp., *Colletotrichum* sp., and *Alternaria* sp., on the flavour and colour of canned tomato juice incubated for five weeks after inoculation.

The general effect of the moulds was to raise the pH from just over 4 to various levels above this. In most samples off-flavours and odours were produced between the second and third week. Yeasts caused sour flavours and characteristic odours within the first week of incubation. It is possible, however, that off-flavours may be caused by moulds growing on tomato fruits or the crushed product prior to sterilization and enclosure. This contamination may be acquired at any point between the fields and the canning plant.

Cordon (T. C.), Rogers (J. S.), Mann (C. W.), & Teitell (L.). **Protection of Ordnance leather equipment from molds.**—*J. Amer. Leath. Chem. Ass.*, 44, 7, pp. 472–503, 13 figs., 1949.

In co-operative experiments at the Eastern Regional Research Laboratory and the Frankford Arsenal, Philadelphia, formulas containing a combination of 0·3 per cent. paranitrophenol and 2·2 per cent. salicylanilide conferred satisfactory protection on leather against moulds under conditions of severe tropical exposure [*R.A.M.*, 28, p. 476]. The formula containing 2 per cent. paranitrophenol (U.S. Army Specification 92–61) was an effective moisture- and mould-proofing treatment for leather. Formulas containing 0·6 per cent. paranitrophenol or 2·2 per cent. salicylanilide were ineffectual under the exacting conditions of the tests, and dinitro-ortho-cresol also failed in the Canal Zone, though superior to paranitrophenol in the laboratory. An appendix gives the results of tests of 50 fungicides on leather.

Day (Dorothy). **A method of growing fungi on leather.**—*J. Amer. Leath. Chem. Ass.*, 44, 8, pp. 558–572, 2 figs., 1 diag., 1949.

In experiments (with the technical assistance of R. J. Brown and T. M. Powers) at the Quartermaster Research and Development Laboratories, Philadelphia, the author found direct inoculation of leather with a spore suspension of *Aspergillus niger*, TC 215–4247, preferable to placing the sample on a mat of mycelium of the fungus growing on sugar agar. The former method permits the satisfactory use of an inert substratum, such as water agar. Glass tubes fitted with suitable covers, e.g., cork stoppers plus paper caps, and filled with moist quartz gravel form effective humidity chambers for long-term experiments in growing pure cultures of *A. niger* on leather.

Block (S. S.). **Fungicide-treated Cotton fabric. Outdoor exposure and laboratory tests.**—*Industr. Engng Chem.*, 41, 8, pp. 1783–1789, 5 figs., 1949.

At the Engineering and Industrial Experiment Station, Gainesville, Florida, fungicide-treated cotton fabric strips were given two years' outdoor shade exposure tests. The rainfall was 70 in. the first year and 52 in. the second. All the treated strips contained 1 per cent. by weight of fungicide when dry, and one series had supplementary water-repellent treatment.

The untreated controls lost an average of 67 per cent. initial tensile strength during the first year of weathering and 93 per cent. the second, the corresponding figures for those treated only with a wax-aluminium water-repellent being 49 and 90 per cent., respectively. The superficial stain produced by angiocarpous fungi (mostly Sphaeropsidales) [*R.A.M.*, 25, p. 467] afforded a visual indication of the extent of the deterioration. The only samples to withstand the two years' weathering without appreciable damage were those treated with copper preservatives and silver pentachlorophenate. The latter gave the best results of any of the fungicides tested [ibid., 23, p. 71], but the cost of silver may preclude its use except for

special applications. Within the copper group the tensile strength loss ranged from 0 to 19 and 12 to 45 per cent. in the first and second years, respectively. Copper chromate with a high initial copper content conferred excellent protection over the two-year period. Mercurials and other heavy metal compounds were less effective. The phenolics, dowicide 7, fungicide G4, shirlan, and fungicide 242, used with a water-repellent, were the only organic preparations that rendered the fabric reasonably resistant to microbial decomposition during the first year. For longer service life, however, they should apparently be used at a concentration exceeding 1 per cent. or in conjunction with efficient water-proofing agents.

The results of laboratory soil burial tests were in general agreement with those of the outdoor exposures. Soil burial for one and two weeks caused about the same degree of deterioration of the fabric as one and two years of natural weathering. Samples treated with silver pentachlorophenate showed exceptionally high resistance to disintegration in soil burial compared with the performance of other compounds.

Marsh (P. B.). **Fabric mildew-resistance tests with organisms tolerant toward copper and mercury.**—*Amer. Dyest. Reptr*, 38, 11, pp. 436, 451–452, 2 graphs, 1949.

In order to obtain quantitative data on the reactions to copper- and mercury-containing fungicides of a wider range of organisms than the two commonly used in fabric mildew resistance tests, namely, *Chaetomium globosum* and *Myrothecium verrucaria*, a number of other species and strains were included in the present series of trials with cotton duck. *Aspergillus fumigatus*, a strain of *Humicola*, *Gliomastix convoluta*, and *Penicillium simplicissimum* aff. proved to be much more tolerant of copper naphthenate [*R.A.M.*, 28, p. 410], copper oleate, copper 'tallate', and copper hydrogenated resinate (0·1, 0·2, 0·4, and 0·8 per cent.) than either *C. globosum* or *M. verrucaria*, while a strain of *Thielavia* and *A. terreus* were intermediate. In the pure culture and soil burial tests with pyridyl mercury stearate (0·025 to 0·3 per cent.) a particularly high degree of tolerance was manifested by *P. simplicissimum*.

Marsh (P. B.), & Bollenbacher (K[atharina]). **The fungi concerned in fiber deterioration : their occurrence.**—*Text. Res. J.*, 19, 6, pp. 313–324, 11 figs., 1949.

Numerous observations, some original and others assembled from the relevant literature, point to the prevalence of the following fungi on fibres [see next abstract] in particular types of situations: *Alternaria*, *Cladosporium herbarum*, and *Fusarium* (especially *F. moniliforme* [*Gibberella fujikuroi*]) on cotton which has undergone weathering in the field before harvest; *Alternaria* and *C. herbarum* on cotton fabric in relatively short-term, moderate- or high-light weather exposures, with *Phoma*, *Leptosphaeria*, and the related forms of each and *Pullularia pullulans* appearing after longer periods under the same conditions; *Alternaria*, *C. herbarum*, *P. pullulans*, and sometimes *Fusarium* on dew-retting flax and hemp; *Aspergillus*, *Penicillium*, *Stachybotrys*, and *Chaetomium* on cotton and other natural fibres in unprocessed or in textile form in damp storage; *A. fumigatus* on jute which has sustained microbiological damage in the bale; and *Halophiobolus* and certain other unusual salt-water-adapted forms on rotting cordage in marine exposures. Soil-contact exposures are believed to involve a very wide range of fungus forms, including numerous genera and species uncommon in moderate- or high-light above-ground situations. Evidence is presented that the resistance of fungi to sunlight is an important factor in determining which species grow on fibres in various types of exposures, while specific differences in moisture and temperature requirements are also significant in this connexion.

Many of the papers in the bibliography of 60 titles have been noticed in this *Review*.

Marsh (P. B.), Bollenbacher (K[atharina]), Butler (M. L.), & Raper (K. B.). **The fungi concerned in fiber deterioration II: their ability to decompose cellulose.**—*Text. Res. J.*, 19, 8, pp. 462–484, 1 fig., 1949.

On the basis of a survey of the pertinent literature and of test results here reported on over 400 fungus isolates, cellulose-decomposing activity [*R.A.M.*, 27, p. 486 and next abstract] is shown to be very widespread but not universal. It occurs with a high degree of regularity among isolates of certain genera, such as *Alternaria*, *Chaetomium*, *Curvularia*, *Fusarium*, *Gliomastix*, *Helminthosporium*, *Humicola*, *Memnoniella*, *Stachybotrys*, and *Trichoderma*. Many of the several groups or subdivisions of *Aspergillus* comprise species with this property, which is also associated with a much smaller but rather widely divergent group within the genus *Penicillium* [cf. ibid., 28, p. 24], whereas the Mucoraceae appear to be devoid of cellulose-decomposing ability and among the Actinomycetes it is probably rare.

Experiments with ten isolates of *Cladosporium herbarum* showed that the temperature optima for growth are distinctly below the 30° C. used by several other workers. At this temperature only two of the isolates showed definite activity after a fortnight, whereas all ten caused extensive loss of strength in strips of cotton duck with 20°. Tests with *Pullularia pullulans* failed to disclose cellulolytic properties. Many of the 48 papers comprised in the bibliography have been noticed in this *Review*.

Siu (R. G. H.), Darby (R. T.), Burkholder (P. R.), & Barghoorn (E. S.). **Specificity of microbiological attack on cellulose derivatives.**—*Text. Res. J.*, 19, 8, pp. 484–488, 1 graph, 1949.

Experiments on the growth of nine species of fungi isolated from deteriorated cotton textiles, viz., *Aspergillus niger*, *A. flavipes*, *Pestalotia* sp., *Chaetomium globosum*, *Gliocladium* sp., *Penicillium* sp., *Memnoniella echinata*, *Gliomastix convoluta*, and *Myrothecium verrucaria*, uniformly revealed their incapacity to utilize derivatives of glucose, mannose, cellobiose, and cellulose. Despite a wide range of substituents on various carbohydrates, almost if not absolutely complete resistance to microbiological attack was exhibited by the compounds tested. In the case of cellulose [see preceding abstract], the available data suggest that micro-organisms are capable of digesting unsubstituted anhydroglucose units at any position in the chain of a partially substituted cellulose derivative.

Hochapfel (H.). **Beobachtungen über das Auftreten der Pfirsichblattlaus in Nordbaden während der beiden Extremjahre 1947 and 1948 im Zusammenhang mit der Frage des Kartoffelabbaues.** [Observations on the occurrence of the Peach aphid in northern Baden during the two extreme years 1947 and 1948 in connexion with the question of Potato degeneration.]—*NachrBl. biol. Zent-Anst. Braunschw.*, 1, 5, pp. 72–73, 1949.

The investigations herein described were planned in 1946 on account of the crisis arising in south Germany through the conflicting interests represented, on the one hand, by the extensive and economically valuable peach cultivation, and on the other by the need for an increase in potato production as an essential requirement of the national dietary. The latter goal is threatened by the former owing to the role of the peach aphid [*Myzus persicae*] in the spread of the viruses responsible for potato degeneration [*R.A.M.*, 20, p. 487 *et passim*]. In the two following years the studies were carried out in six fair-sized experimental fields in the Rhine plain and in the southern spurs of the Odenwald. At the same time the local agricultural potato stands were inspected. In this way two climatically

divergent situations fell within the range of observations—the plain with intensive peach cultivation as a well-marked area of degeneration in contrast to the more or less healthy mountainous region adjoining it on the east.

The weather favoured the project inasmuch as 1947 and 1948 were marked by conditions of extreme dissimilarity. The hot, dry season of 1947 was accompanied by a mass multiplication of aphids on early planted potatoes, 6,000 to 7,000 being counted on 100 leaves, whereas in 1948 the numbers seldom rose to between 500 and 900. In the former year, therefore, many more viruliferous summer alates were produced and consequently up to 85 per cent. primary leaf roll developed in the Rhenish experimental fields, with 95 per cent. heavily infected stands in the progeny of 1948 as against only 10 per cent. in the Odenwald.

The following are among the most important facts relative to the control of potato viruses, especially the destructive leaf roll [see next page], emerging from these investigations. The frequency of aphid occurrence during the summer is dependent on the weather in May to June and not on the magnitude of the flight from the peach trees in the spring. Amounts of rainfall exceeding 80 mm. prevent mass multiplication. The activity in leaf roll transmission in 1947 by the incoming waves of summer alates was mostly confined to the end of June and early July. In general, the effects of these transmissions do not become apparent until August, that is to say, after the final inspection for certification, which is commonly made before the end of July. Hence the progeny of certified seed may be very disappointing after a season of heavy aphid infestation, such as 1947. A supplementary visit to the fields at a later date should be interpolated in the certification programme, the success of which will otherwise be largely invalidated by the insidious introduction of the viruses when they are no longer expected.

In regions like northern Baden, where the abandonment of peach cultivation cannot be defended on economic grounds, and where also the aphids breed in the open in normal winters, control measures should be based primarily on the extermination of the spring and summer winged forms. In this connexion it is emphasized that diseased potato crops harbouring summer alates are a much greater menace than peach trees. In addition to healthy 'seed' the potato-grower now has at his disposal the preparations E 605f spray and E 605 dust, a single treatment with either of which during the first half of June, before the appearance of the summer alates, will eliminate practically every aphid from the crops.

Kramer (P. J.) & Wilbur (K. M.). **Absorption of radioactive phosphorus by mycorrhizal roots of Pine.**—*Science*, 110, 2844, pp. 8–9, 2 figs., 1949.

Radio-autographs of mycorrhiza and non-mycorrhizal root pieces of *Pinus taeda* and *Pinus resinosa* seedlings immersed for 3 to 4 hours in a radioactive phosphorus solution indicated that the former can accumulate much more phosphorus than non-mycorrhizal parts. Root segments with short, unbranched, pseudomycorrhizal lateral roots appear to accumulate more phosphorus than typical unsuberized root tips. Apparently mycorrhiza have not only a greater surface, but also a greater capacity to accumulate phosphorus per unit of surface than non-mycorrhizal roots. In pine roots the area of maximum intake of minerals appears to be the older regions where mycorrhiza or pseudomycorrhizal branch roots have developed.

Köhler (E.), Bode (O.), & Hauschild (J.) [Irmgard]. **Vergleichende Untersuchungen über die Blattroll-Resistenz von 5 mittelspäter Kartoffelsorten.** [Comparative studies on the leaf roll resistance of five medium-late Potato varieties.]—*NachrBl. biol. Zent-Anst. Braunschw.*, 1, 6, pp. 81–82, 1949.

Of five medium-late potato varieties tested in 1947–8 in plots of 10 by 10 hills

each at the Virus Research Institute, Celle, for their reaction to the leaf roll virus [see preceding page], Aquila proved to be the most resistant (14 per cent. infection), followed by Heida (33), Johanna and Voran (65), and Ostbote (85). As already explained [*R.A.M.*, 16, p. 402], 'resistance' and 'tolerance' must be clearly distinguished, and a further experiment was carried out to determine the effect of the disease on yield. Heida was the most productive of the five varieties, with approximately 60 kg. in 1947 and 78·9 in 1948, followed by Aquila (55·4 and 67·5), Johanna (46·4 and 58·1), Voran (46 and 54), and Ostbote (40·5 and 48·6). The varieties are graded as follows on the basis of all the experimental data: Heida, resistance to infection fairly high, tolerance high; Aquila very high and very slight, respectively; Johanna and Voran low and high, respectively; and Ostbote very low and high, respectively. Further statistics confirming the high degree of resistance to leaf roll in Aquila are cited from another experiment in Germany and one carried out by R. Salzmann in Switzerland.

Hauschild (Irmgard). **Zur Beurteilung des Pflanzgutwertes von Saatkartoffelfeldern unter Berücksichtigung des Auftretens der Überträger der Kartoffelvirosen. Versuch einer rechnerischen Lösung des Problems.** [On the assessment of the value of seed Potato fields as planting sites with reference to the occurrence of the vectors of Potato viruses. Attempt at a mathematical solution of the problem.]—*Züchter*, 17–18, 6–8, pp. 242–247, 3 graphs, 1947. [Received August, 1949.]

The writer seeks to assess the connexion between the incidence of aphid vectors and the distribution of potato viruses and to express it, as a working hypothesis, in the form of a differential equation, which is resolved by an exponential function for the dependence of the ratio of diseased to healthy plants on the aphid-time integral, i.e., the threshold value of the sum-total of the aphid days of the summer [cf. *R.A.M.*, 25, p. 311]. Its point of intersection with the ordinate is defined by the initial value of the infection sources, while its gradient is of a specific magnitude for an individual virus and potato variety, and can be determined experimentally, serving as a criterion for the influence of the aphids on the distribution in a potato field of the virus diseases they transmit. When this gradient is determined, it will be possible to study aphid incidence quantitatively in connexion with the assessment of the value of potato fields as planting sites, thereby arriving at a more correct prognosis of health than by the method in current use, in which only the number of visibly diseased plants is statistically evaluated.

Salaman (R. N.). **Some notes on the history of curl.**—*Tijdschr. PlZiekt.*, 55, 3, pp. 118–128, 1 fig., 1949. [Dutch summary.]

The author has assembled a number of interesting records relating to the history of potato 'curl'. The first reference to the disease in Great Britain apparently dates from 1751, when R. Maxwell in 'The Practical Husbandman' describes a decline in the Galloway crops, necessitating their replacement by fresh stocks from England or Ireland, which points to infection by a virus. In 1764 it was reported from Lancashire and subsequently spread to all the main potato-growing districts of England. By 1800 north-country farmers had already adopted the practice, not to become general in the midlands and south for another 100 years, of procuring their 'seed' from a few regions free from the disease, such as the moss lands of Lancashire, the Hebrides and parts of Scotland, and the limestone hills of Denbighshire. All these areas enjoy the climatic conditions now recognized as adverse to the aphid vectors of potato viruses, namely, high moisture-laden winds and heavy rains [cf. *R.A.M.*, 25, p. 311].

On the continent the presence of 'curl' was demonstrated some 30 years earlier than in Great Britain, and the earliest description seems to be that given by

C. T. Hoppe in a thesis dated 1747 from Wolfenbüttel, Brunswick, Germany. Reference is made to several other reports of the disease from German sources, while it was mentioned by A. Parmentier in an essay on the potato in France in 1780. Discussing the identity of the viruses responsible for 'curl', the author adduces evidence for the implication of virus Y during the early years, prior to the first decade of the 20th century, when the leaf roll virus began to spread in epidemic form and has now become predominant.

Research on potato viruses is now entering on a new phase, passing out of the hands of the biologist into those of the statistician and physicist. In this connexion the author feels that a note of warning is apposite, and that the brilliant discoveries in the realms of mathematics and physical chemistry should not be allowed to obscure the urgent need for the training of young workers to carry on the great traditions of phytopathology.

Conroy (R. J.), Shirlow (N. S.). Wilson (R. D.), & Waring (E. J.). **Tuber transmission of the spotted wilt disease of Potatoes.**—*Agric. Gaz. N.S.W.*, 60, 2, pp. 101–103, 1 fig., 1949.

During 1947, an experiment was carried out at Hawkesbury Agricultural College, New South Wales, to secure further information on the importance of the carry-over of the tomato spotted wilt virus [*R.A.M.*, 28, p. 52] in potato tubers.

Plots of about 500 tubers each were planted in late July, two with tubers from a certified crop apparently free from spotted wilt and three with Up-to-date tubers harvested from two crops showing 100 per cent. spotted wilt. The plots were separated from each other by distances ranging from 55 to 85 yds. Counts were made at approximately weekly intervals from September to December. The percentage of affected plants observed during the last count was 16·27 for those from the affected tubers and 7·38 from the healthy ones. Discounting secondary infections it is concluded that only about 3 to 5 per cent. of the resulting plants produced symptoms of the disease as a result of infection from the tubers. The yield from the affected plants was estimated to be about a quarter of that from healthy plants. As a result of this apparently low percentage of tuber transmission a spotted wilt tolerance of 5 per cent. at either first or second inspection for certification was allowed during 1947–8, apart from the tolerance for all other diseases combined. Despite this higher tolerance 'seed' crops should still be rogued thoroughly to prevent trace infection.

Folsom (D.), Simpson (G. W.), & Bonde (R.). **Maine Potato diseases, insects, and injuries.**—*Bull. Me agric. Exp. Sta.* 469, 49 pp., 22 figs., 1949.

Following an explanatory list of the technical terms used in this bulletin and a section on the standard measures to be adopted against potato infections in general, brief, practical notes are given on the symptoms and control of potato diseases and injuries caused in Maine by, fungi, bacteria, and viruses, weather and soil conditions, and human agency. There are also short sections on inherent abnormalities and disorders of unknown origin. A series of identification tables is given.

Fukushi (T.). **Further studies on the dwarf disease of Rice plant.**—*J. Fac. Agric. Hokkaido Univ.*, 45, 3, pp. 83–154, 2 pl., 9 diag., 2 figs., 1940. [Received August, 1949.]

Some of the results of these experiments conducted at the Hokkaido Imperial University, Japan, from 1934–39 with the leaf-hopper *Nephotettix apicalis* [var.] *cincticeps*, the vector of dwarf disease of rice, have already been noticed [*R.A.M.*, 18, p. 613], but the following may be mentioned, which appear to confirm the

previous hypothesis that the virus multiplies in the insect [loc. cit.]. There was a delay of 7 to 38 days in the development of the infective capacity of nymphs emerging from viruliferous eggs. Considerable variation was observed in the infectivity of different insects; in some the non-infective period lasted 14 to 15 days; in others the infective capacity was reduced or lost late in adult life, or was retained throughout life.

When the progeny of (1) non-viruliferous parents, (2) crosses between infective females and non-viruliferous males, and (3) infected parents were reared on diseased material, 12, 68, and 92 per cent., respectively, acquired and transmitted the virus. It appears, therefore, that the virus is able to multiply only in those leaf-hoppers, possessing certain hereditary characters, which appear to be dominant.

The incubation period of the virus in the leaf-hopper varies from 10 to 73 days, mostly 30 to 45 days.

Soetardi (R. G.). **Geslaagde inoculatieproeven met Phomopsis heveae (Petch) Boedijn, geisoleerd uit jonge Heveazaailingen met stengelinsterving.** [Successful inoculation experiments with *Phomopsis heveae* (Petch) Boedijn, isolated from young *Hevea* seedlings with stem die-back.]—*Arch. Rubbercult.*, 26, 4, pp. 279–288, 3 figs., 1949. [English summary.]

Phomopsis heveae [*R.A.M.*, 9, p. 561], *Gloeosporium* sp., and *Fusarium* sp. were isolated from young *Hevea* rubber seedlings received from the Peweja experimental garden near Batavia (Java) in August, 1948. Under appropriate conditions isolates of the first-named organism from the pith of diseased plants proved capable of causing die-back on the young, succulent portions of four-month-old seedlings, but it failed to infect the woody tissues, even through wounds.

The first symptoms of the die-back are small, elliptical, brown, sometimes wet lesions, situated at a distance of 5 cm. or more from the top, which subsequently coalesce, girdling the stem and slowly killing the portion above the site of infection. The petioles of the upper leaves may also be attacked, resulting in the fall of the leaf blades. Canker-like swellings are formed over the lesions in surviving plants on the way to recovery.

P. heveae is a pathogen of unthrifty plants, enfeebled by adverse environmental conditions, infestation by mites, and the like, and control measures should be directed towards an improvement in health through soil amendments and pest extermination.

Cantournet (J.). **Contribution à la flore mycologique de l'Afrique Équatoriale.** [A contribution to the mycological flora of Equatorial Africa.]—*Bull. Soc. mycol. Fr.*, 64, 3–4, pp. 166–179, 10 figs., 1948.

Descriptions are given of seven new species and one new genus of fungi from the French Cameroons. *Didymosphaeria polyspora* n.sp. produces pale brown spots with a darker border on living leaves of *Hevea* rubber at Dizangue, Cameroons. Very irregular in shape and size, they become confluent and may cover one-third of the leaf surface, in which case the leaf turns yellow in the uninfected parts. The globular to subglobular ostiolate perithecia measure 85 to 120 (average 100) μ in diameter; at first subepidermal they later become slightly erumpent and they have rather thick carbonaceous walls. The oblong-clavate asci, shortly pedicillate and rounded at the summit, measure 40 to 60 by 6 to 10·5 (average, 49·5 by 8·4) μ. The filiform, hyaline paraphyses, slightly swollen at the summit, measure 1·5 μ in diameter. Eight ascospores are typically present, measuring 12 to 17 by 3·2 to 5 (average, 14·9 by 4·2) μ.

Asteronectrioidea heveicola n.gen., n.sp. was also found on living leaves of *Hevea* rubber at Dizangue. Narrow bands of various widths appear on the upper surface

of the leaves, radiating out from a definite centre and branching in a very complex manner. These bands are yellowish to green and become dirty-white to greyish with age. The fructifications appear as small pustules 0·2 to 0·25 mm. in diameter; they occur either in series of three to six along the bandlets of the subiculum or in groups of three to ten at the points of ramification where the subiculum is noticeably wide. In section, the subiculum consists of a hyaline, loose mycelial network which takes various shapes. In the predominant type the mycelium has successive, large flask-shaped swellings; wide, isodiametrical hyphae are also seen in the subiculum, together with thinner, little-branched ones. The globose to sub-globose pycnidia form inside the subiculum; they have thin, hyaline walls, are ostiolate, and measure 80 to 95 μ in diameter. The hyaline, fusoid, one- later two-celled, straight or slightly bent pycnospores, with rather tapering or round extremities, one cell often being larger than the other, measure 14·8 to 19 by 1·8 to 2·9 (average 16·5 by 2·1) μ.

Jamalainen (E. A.). **Boorin puutteesta aiheutuvista kasvitaudeista ja boorin merkityksestä maamme kasvinviljelyssä.** [Boron deficiency diseases and the role of boron in plant cultivation.]—*Valt. Maatalousk. Julk.* 130, 48 pp., 18 figs., 1 map, 1949. [English summary.]

Boron deficiency appears to be widespread in the soils of Finland. In the south, for instance, its symptoms were prevalent in the swede and beet crops even in acid soils, and could not be counteracted either by liming or heavy applications of a complete fertilizer. As a result of the improved beet yields obtained by the use of boron in trials on light clay soil at the Karelian Agricultural Experiment Station, Hannila, the Department of Plant Pathology of the Agricultural Research Institute now recommends for dry rot control [*R.A.M.*, 16, p. 790] the application of 10 kg. boric acid or 15 kg. borax per ha., to be spread either with the fertilizers before sowing the seeds or with the calcium nitrate on the seedlings.

Boron deficiency in swedes, manifested as brown heart, was particularly apparent in Finland from 1940 to 1945, when the roots were in exceptionally large demand as a foodstuff and at the same time boron fertilizers were unobtainable owing to war conditions. The treatment recommended is the same as for beets, but where severe damage is anticipated borax may be applied at dosages up to 30 kg. per ha. without risk of injury to the crop.

Internal cork of apples was unusually prevalent in the dry summers of 1939 and 1947, possibly owing to the inaccessibility of the boron resources of the soil under these conditions. The amounts of boric acid (100 to 200 gm.) or borax (200 to 400 gm.) previously prescribed for sprinkling round the trees [ibid., 16, p. 324] may have to be increased in seasons favourable to boron deficiency.

From 1946 to 1948 boron deficiency was observed in a number of other crops in east-central Finland, including (besides those already listed [ibid., 27, p. 337]) carrot, cruciferous oil plants, and pear [ibid., 27, p. 530].

Chamberlain (E. E.) & Clark (P. J.). **Investigations on growing Pyrethrum in New Zealand. II. Selection of clones: their variation in habit of growth, susceptibility to root-rot, yield and pyrethrin content of flowers.**—*N.Z.J. Sci. Tech.*, A, 29, 4, pp. 215–222, 2 figs., 1947. [Received August, 1949.]

Pyrethrum (*Chrysanthemum cinerariaefolium*) is liable to suffer from a disease known as root or crown rot [cf. *R.A.M.*, 26, p. 233] in waterlogged soils in New Zealand. Out of 39 clonal lines obtained from selected seedlings by vegetative propagation, one known as A 24 has remained virtually free from the disease over a period of 11 years. In another, B 1, yield reductions during the same time have been consistently light.

Clark (P. J.), Chamberlain (E. E.), & Procter (C. H.). **Investigations on growing Pyrethrum in New Zealand. III. Factors influencing pyrethrin content of flowers.**—*N.Z.J. Sci. Tech.*, A, 29, 4, pp. 223–232, 1 fig., 1947. [Received August, 1949.]

During the first two years of investigations on pyrethrum (*Chrysanthemum cinerariaefolium*) cultivation in New Zealand, considerable difficulty was experienced in drying the freshly harvested flowers, which were subject to infection by moulds (mainly *Penicillium* spp.) when spread out on benches or barn floors. The results of analyses of clean and diseased flowers from the crop of two selected clones revealed a loss in pyrethrin content ranging from 25 to 49 per cent. due to this source.

Mahmud (K. A.). **Survey of foot-rot of Pan (Piper betle) in the Central Provinces.**—*Mag. agric. Coll. Nagpur*, 24, 3–4, pp. 3–6, 1949.

The writer's survey for foot rot of *Piper betle* covered 49 centres of cultivation situated in 13 districts of the Central Provinces and Berar, India. *Phytophthora parasitica* var. *piperina* [*R.A.M.*, 28, p. 30] and *Pythium piperinum* [*P. vexans*: ibid., 14, p. 718] were isolated from plants of all ages, while the sclerotial fungi, *Rhizoctonia* [*Corticium*] *solani* [ibid., 28, p. 82], *R. bataticola* [*Macrophomina phaseoli*] and *Sclerotium rolfsii* [ibid., 28, p. 242] were collected mostly on plants over three years old. The two former pathogens gave 100 per cent. positive results in inoculation experiments, compared with only 1 per cent. for the three latter.

Phytophthora parasitica var. *piperina* was found in every one of the centres visited, being solely responsible for the disease in 29 and the principal agent in 13. Infection is carried from one locality to another on 'seeds' or pan cuttings, and diseased leaves rapidly spread the disease to all parts of the garden. The fungus can persist in the soil and on weeds. *Pythium vexans* occurred exclusively in the northern districts, where it was observed in nine out of 19 centres, being the main cause of foot rot in five and of secondary importance in four. *C. solani* and *M. phaseolicola* were present in all parts of the Province, whereas *S. rolfsii* was confined to the north; the three fungi were found in 11, 4, and 5 centres of cultivation, respectively. Only in one centre was one of these organisms, *C. solani*, the chief agent of foot rot.

The various factors governing the regional distribution of the fungi attacking *Piper betle* are briefly discussed.

Bose (S. K.) & Mathur (S. C.). **A new leaf-spot disease of Castor, Ricinus communis L.**—*Curr. Sci.*, 18, 6, pp. 210–211, 1 fig., 1949.

Phyllosticta bosensis n.sp., the agent of a leaf spot of *Ricinus communis* at Kanpur, United Provinces, produces on diseased plants pycnidia measuring 25·2 to 97·2 by 14·2 to 42·2 μ and containing hyaline to faintly greenish, unicellular, oblong, biguttulate pycnidiospores, 4·3 to 10·8 by 1·8 to 2·8 μ. The lesions formed during July, after the onset of the rains, are 0·4 to 1·2 cm. or up to 2·5 cm. in diameter, mostly circular but occasionally angular. They may coalesce to form irregular patches, but the main veins are never traversed. The enlargement of the spots, which attain their maximum size in 10 to 16 days, is accompanied by the formation of zones of varying shades of brown. The centre often becomes white, papery, and brittle, and ultimately shot holes develop. The lesions shrivel from the centre outwards, and successive concentric rings (up to five) of pycnidia are formed at the margin of each dry area as desiccation advances.

The spores germinate freely in water, producing a germ-tube from one end within six to eight hours. Good growth is made on potato dextrose, castor leaf decoction, and oatmeal agars. After four or five days dark greenish spore masses,

turning black within the next day or two, develop sparsely over the white, circular, compact colonies. No pycnidia are formed, the spores being abstricted from the apices of the hyphal branches.

Nearly all the inoculation experiments performed on the leaves under humid conditions in September were successful. Within three days the infected areas turned yellow, later becoming thin and brown, and after 8 to 10 days typical spots bearing pycnidia developed. Negative results were given by tests on other parts of the plants.

The disease was effectively combated in 1948 in the Economic Botanist's oil seed experimental plots by two applications of 4–4–50 Bordeaux mixture or perenox at the prescribed concentration.

This appears to be the first record of a *Phyllosticta* on *R. communis* in India. The spores of *P. ricini*, described by Rostrup from Denmark, measure 6 to 7 by 3 to 4 μ.

Hoerner (G. R.). **Hop diseases in the United States.**—*Brew. Dig.*, 24, 4, pp. 45–51, 24 figs., 1949.

During 1948 there were approximately 40,554 acres of hops under cultivation in the United States, producing an average yield of 135 lb. per acre. In this paper the author summarizes and discusses the available information on the diseases of the crop and their control.

Crown gall (*Agrobacterium* [*Bacterium*] *tumefaciens*) [*R.A.M.*, 24, p. 271] has been present for many years in the hop-yards of California, Oregon, and Washington and may persist for some time without detection on well-established plants. The disease is not generally serious, but when it is the affected plants should be eradicated and the underground parts burnt.

Downy mildew (*Pseudoperonospora humuli*) remains the most formidable menace to profitable hop production in the United States. A typical yard in early spring may contain a thick cover of weeds or cover crop, retaining moisture and preventing aeration round the hills, which are often surrounded by masses of hop seedlings arising from the cones of the previous harvest. These seedlings frequently mature before the shoots from the crowns appear and contract infection during their passage through soil contaminated with winter spores from the last season's refuse. Basal spikes are a common result of developing shoots becoming infected with summer spores produced on the diseased seedlings. Crown treatments with calcium cyanamide are recommended to prevent this early infection (*Ext. Circ. Ore. St. Coll.* 516, 2 pp., 1948). Field sanitation is an important part of the control programme, which should include progressive stripping of the lower leaves and the prompt removal and destruction of basal, terminal, lateral, and nodal spikes as they appear. Overhead sprinkling is now becoming a common practice in Oregon, and care should be exercised in its use to prevent the infection of cone-bearing laterals and the developing cones. The writer has developed a rosin-potash preparation suitable for incorporation with liquid sprays to assist coverage (*Circ. Inf. Ore. agric. Exp. Sta.* 236, 2 pp., 1941).

Sooty mould (*Cladosporium aphidis*) [*R.A.M.*, 24, p. 118] is responsible for heavy annual losses in all the leading hop-growing sections of the United States. All the aerial portions of the vine may be covered by the sooty-black honeydew excreted by the aphids [*Phorodendron humuli*] on which the fungus grows. The most serious condition develops when the aphids enter the cones, followed by the appearance of the mould, where its presence is readily detected after the hops are dried. Mouldy hops, if saleable at all, normally fetch a lower price, since they tend to impart a flavour to the beverages in which they are used. Hop-yards in the vicinity of plum trees or other winter hosts of the aphid are often subject to severe infestation by spring migrants, and great vigilance is required to prevent it.

Powdery mildew (*Sphaerotheca humuli*) [loc. cit.] appears early in the season and remains active until harvest time. All the above-ground parts of the bine are attacked and in wet seasons heavy crop losses are sustained by growers who neglect the recommended control measures. Burning badly mildewed vines in the autumn destroys the resting spores of the fungus and reduces the incidence of early spring infection. Early spring training and stripping of the lower leaves are also helpful, while sulphur dusts or sprays should be applied as soon as the mildew appears.

Root rots are of increasing concern to Pacific Coast growers, especially in Oregon. Commonly associated with mechanical injuries to the crowns due to pruning and other cultural operations, they result in the loss of newly planted cuttings and the gradual weakening and eventual death of older plants. They are usually dry rots, accompanied by a brown or black discoloration of the diseased tissues. *Armillaria mellea* [ibid., 19, p. 364] was reported from Oregon in 1916 and has been observed in the State by the writer, but the extent of its distribution is not known. *Phytophthora cactorum* [ibid., 25, p. 140] has not been definitely identified on hops in the United States, though roots with an infection suggestive of the 'black root rot' described by Brien in New Zealand [ibid., 18, p. 55] have been found. The local 'root' rot problem involves not only damage to crowns and the true roots of established plants but high mortality among newly planted cuttings (which have been selling in recent years for up to $30.00 per thousand) and heavy losses of planting stock, particularly in the Early Clusters variety, through widespread rotting of the underground stolons produced by crowns which may show no external symptoms. The only feasible control measures are indirect, consisting in the use of healthy, unwounded cuttings for planting and care in the pruning and cultivation of established plants.

Dr. R. O. Magie, formerly of the New York (Geneva) Agricultural Experiment Station, has reported seven disorders of hops believed to be of virus origin, namely, chlorosis [cf. ibid., 15, p. 257] affecting 'English' Clusters and characterized by small, chlorotic areas, later splitting or abscissing, with a shot hole effect, on mature leaves, and curling, leaf-splitting, and intervenal chlorosis of young ones; leaf distortion of 'English' Clusters, in which the lamina splits between the veins, as in split leaf blotch [ibid., 14, p. 423 *et passim*], also observed by Magie on Fuggle; ring spot of 'English' Clusters, characterized by small, necrotic, brown spots within the rings and small, excised areas in the green portions, an unusual feature of ring spot; ring spot chlorosis, with necrotic lesions resembling some types of downy mildew; slip-down [ibid., 17, p. 377], Magie's two figures of which on 'English' clusters present analogies with Keyworth's fluffy tip [ibid., 19, p. 364] and nettle-head [ibid., 26, p. 419]; yellow flecking, very prevalent on 'English' Clusters, Brewer's Gold, and other varieties; and hop mosaic virus [ibid., 19, p. 364], commonly known as 'blight' in Oregon, where up to 40 per cent. reduction in yield has occurred in a single season and entire plantings have been killed in a few years.

Wilt (*Verticillium albo-atrum* and *V. dahliae*) [ibid., 22, p. 112; 28, p. 358] is not definitely known to be present in the United States, although some of the associated symptoms have been observed by the writer. Canker (*Fusarium* sp.) [ibid., 11, p. 127] occurs in the Willamette Valley, where a so-called 'Bavarian' variety is particularly susceptible.

Salmon (E. S.). **Two new Hops resistant to Verticillium-wilt.**—*J. Inst. Brew.*, N.S., 46, 4, pp. 234–236, 4 figs., 1949.

The characters of two new hop varieties resistant to *Verticillium albo-atrum*, Keyworth's Midseason (OR55) and Keyworth's Early (OJ47) [*R.A.M.*, 28, p. 241], are fully described. Both are symptomless carriers of hop mosaic virus but are more

susceptible than Fuggle to downy mildew [*Pseudoperonospora humuli*]. In 11 out of 13 breweries where trials were carried out in 1945 and 1948 the new varieties were provisionally approved for use in a 10 to 30 per cent. blend with other hops. Rooted sets are available.

RAMAKRISHNAN (T. S.). **Studies in the genus Colletotrichum. Part IV. Leaf spot of Arundo donax L. caused by Colletotrichum falcatum Went var. arundinis var. nov.**—*Proc. Indian Acad. Sci.*, Sect. B, 29, 6, pp. 289–294, 1 pl., 1 fig., 1949.

Continuing his studies on the genus *Colletotrichum* [*R.A.M.*, 26, p. 544], the writer describes a new variety, *arundinis*, of *Colletotrichum falcatum*, which is responsible for a leaf spot of *Arundo donax* at Coimbatore, Madras. Straw-yellow lesions, with thin, brown margins, up to 2 by 1 cm., surrounded by a yellowish-green halo, develop on the leaves of the reed, which is commonly planted round *Piper betle* gardens to form a protective hedge. *C. falcatum* var. *arundinis* differs from *C. falcatum* (the conidial state of *Physalospora tucumanensis*) in its very slow growth and in the absence of pinkish spore masses in culture. The isolate from *A. donax* proved to be pathogenic to standing sugar-cane stems, indicating that the host is a potential source of danger which should be eradicated from the vicinity of cane fields.

M[ARTIN]-L[EAKE] (H.). **The Sugar Cane in the West Indies. Proceedings of the British West Indies Sugar Technologists' Meeting, British Guiana, 1946. Proceedings of the 1947 Meeting, British West Indies Sugar Technologists, Jamaica.**—*Int. Sug. J.*, 50, 590, pp. 33–35; 598, pp. 258–260, 1948.

In the first of these reports it is stated that in St. Kitts sugar-cane red rot (*Colletotrichum falcatum*) [*Physalospora tucumanensis*: *R.A.M.*, 28, pp. 242, 243, 359] appears to be increasing in prevalence. A serious factor is that it is most common in B 37161, which shows 13·1 per cent. infected stacks, as against 7 per cent. for other varieties, and gives a tonnage cane to sugar ratio of 7·16 when uninfected and 13·09 when infected. A comparison between the degree of red rot injury and that due to insect attack showed that red rot is a wound parasite. The general conclusion is that a growing incidence of disease is partly due to the spread of B 37161, but the increased yield obtained from this variety outweighs the loss from disease. Varietal replacement is likely.

In the second report G. S. STEVENSON discusses the deterioration of sugar-cane varieties in relation to disease.

GREENE (H. C.). **Notes on Wisconsin parasitic fungi. XI. XII. XIII.**—*Amer. Midl. Nat.*, 41, 3, pp. 714–725, 726–739, 740–758, 1949.

The following are among the records in these three further instalments of the writer's annotated list of Wisconsin fungi [cf. *R.A.M.*, 27, p. 498]. A fungus collected on birch (*Betula papyrifera*) leaves with large, irregular, brown, yellow-edged spots is apparently identical with that reported by Davis [ibid., 5, p. 766] as *Sacidium microspermum* (Peck) Davis (*Septoria microsperma* Peck), later renamed by Petrak *Cylindrosporella microsperma* (*Ann. mycol., Berl.*, 22, p. 43, 1924). The author questions the validity of both *Cylindrosporella* and *Sacidium* and is provisionally referring his specimens to *Gloeosporium leptothyrioides* Kabat & Bubák 1907, which he believes to be identical with Peck's species. *Microsphaera alni* occurs on Persian lilac (*Syringa persica*) [*R.A.M.*, 25, p. 280] and *Coleosporium viburni* on *Viburnum opulus*, the latter a new record for the State and elsewhere.

In contribution XII, it is stated that Sprague [ibid., 26, p. 48] regards *Stagonospora simplicior* as predominantly saprophytic, with the exception of a specimen determined by the author as *S. simplicior* var. *andropogonis* on *Sorghastrum nutans*.

The present author reports that a similar, perhaps identical fungus on *Andropogon furcatus* is unquestionably parasitic and has been collected several times in Wisconsin. *Colletotrichum villosum* is recorded by Weimer [ibid., 25, p. 216] as parasitic on a number of *Vicia* spp., including hairy vetch [*V. villosa*] and *V. angustifolia*. He regards this species as distinct from *C. viciae*, whereas in the present writer's opinion the differences in question are scarcely more than varietal.

The ubiquitous saprophyte *Epicoccum neglectum* [ibid., 26, p. 267] has repeatedly been found in Wisconsin on wilting soy-bean leaves under conditions suggesting that it may sometimes act as a weak parasite.

Lophodermium durilabrum and *L. nitens* have been found on pine (*Pinus strobus*). *Phyllosticta cannabis* occurs on hemp [ibid., 19, p. 281], *Phoma mariae* on cultivated *Lonicera* sp., *L. tatarica*, and *L. dioica*, *Septoria exotica* on *Veronica spicata*, *S. macrospora* on *Chrysanthemum leucanthemum* [ibid., 22, p. 154], *Cylindrosporium chrysanthemi* on *Chrysanthemum* sp. (*S. obesa* [ibid., 24, p. 192] may be a synonym), and *Isariopsis griseola* as a virulent pathogen of beans (*Phaseolus vulgaris*) [ibid., 27, p. 351].

In contribution XIII it is recorded that a species of *Phyllosticta*, characterized by conidia with a shadowy, hyaline appendage and apparently identical with the *Aesculus* parasite, *P. paviae*, was found on *Thuja occidentalis* leaves. The conidia of a species of *Alternaria* responsible for a conspicuous leaf spot of *Acalypha virginica* are pale olivaceous, with six to eight horizontal septa and (in some individuals) two to three vertical ones, and are very similar to those figured by Neergaard for *Alternaria linicola* on *Linum* [*grandiflorum rubrum*: ibid., 25, p. 582], a close systematic relative of *Acalypha*.

Watermelons are infected by *Mycosphaerella melonsis* (*Ascochyta cucumeris*) [ibid., 20, p. 516] and parsnips by *Ramularia pastinacae* [ibid., 25, pp. 292, 330].

Macdonald (J. A.). **Handlist of the rust fungi of St. Andrews district.**—7 pp., The University, St. Andrews, 1949.

Macdonald (J. A.). **Handlist of the rust fungi of Loch Duntelchaig basin.**—4 pp., The University, St. Andrews, 1949.

The first of these lists, which follow Wilson's order, numbering, and nomenclature [*R.A.M.*, 14, p. 193], comprises 101 rusts collected between October, 1935, and March, 1949, in the St. Andrews district of Scotland, and the second 51 collected in the Loch Duntelchaig district, about 8 sq. miles south-west of Inverness, between 1932 and 1948.

Ling (L.). **A contribution to the knowledge of the Ustilaginales in China.**—*Mycol. Pap., Imp. mycol. Inst.*, 11, 12 pp., 1 pl., 11 figs., 1945. 2*s.* 3*d.*

This annotated, illustrated list of Chinese Ustilaginales comprises 60 species, including eight new to science and 11 others not previously recorded from China. As Tai listed 60 species in 1937 [*R.A.M.*, 16, p. 840] and other records increased this total to 87, the present list brings the number of smut species known in China to 106. Among those pathogenic to plants of economic importance are *Urocystis japonica* (P. Henn.) Ling n. comb. (syn. *Tubucinia japonica* (P. Henn.) Liro) on *Anemone japonica*, *Ustilago panici-frumentacei* on *Echinochloa frumentacea*, *Sorosporium paspali-thunbergii* on *Paspalum* sp., and *Sorosporium reilianum* (*Sphacelotheca reiliana*) on sorghum.

Ling (L.). **A second contribution to the knowledge of the Ustilaginales of China.**—*Mycologia*, 41, 3, pp. 252–269, 2 figs., 1949.

This is an annotated list of 46 Ustilaginales collected mostly in Taiwan (Formosa) [see preceding abstract], the materials studied having been obtained from the herbaria of the Taiwan Agricultural Research Institute and the National University

of Taiwan, and from the collection of Y. Hashioka. All the species of Ustilaginales recorded from Formosa by Sawada and Ito [cf. *R.A.M.*, 14, p. 532; 15, p. 829; 17, p. 841] have been examined by the writer, several now being reduced to synonymy. Some species described without Latin diagnoses by Sawada after 1935 are now supplied with them, based mainly on the present author's observations.

Nicot-Toulouse (Jacqueline). **Sur quelques Papulaspora du sol.** [On some *Papulaspora* species from soil.]—*Bull. Soc. mycol. Fr.*, 64, 3–4, pp. 209–222, 8 figs., 1 graph, 1948.

A morphological study of *Papulaspora immersa*, *P. appendicularis*, and *P. pannosa*, all isolated from soil, showed these fungi to present quite distinct cultural characters, particularly as regards production and form of bulbils. It is concluded that there is no close structural affinity between a sclerotium and a bulbil. There is some reason, the author considers, to regard the bulbil as a typical reproductive organ, characterized by its mode of development, which is of the budding type, from one or two well-defined initial cells, and by the germinative ability of each of its elements taken separately. This mode of reproduction is not confined to any definite group of fungi and has no taxonomic value.

Eriksson (J.). **The Swedish species of the 'Poria vulgaris-group'.**—*Svensk bot. Tidskr.*, 43, 1, pp. 1–25, 5 pl., 6 figs., 1949.

The author gives revised, annotated descriptions with figures and anatomical notes of six species of *Poria* of the *vulgaris* group [*R.A.M.*, 5, p. 588; 21, p. 476] with thin, white or yellowish, fine-pored, and totally resupinate fruit bodies, including *P. crassa* and *P. luteoalba*, reported for the first time from Sweden, and *P. xantha* f. *pachymeres* n. nov.

Lowe (J. L.). **Studies in the genus Poria. III. White and brightly colored species.**—*Pap. Mich. Acad. Sci.*, 33, (*1947*), Part I, pp. 3–6, 1949.

In continuation of his earlier studies [cf. *R.A.M.*, 28, p. 489] the author presents notes on type collections of 16 species of *Poria*. Thirteen are reduced to certain or probable synonymy, and two are recognized as distinct.

Baxter (D. V.). **Some resupinate Polypores from the region of the Great Lakes. XIX.**—*Pap. Mich. Acad. Sci.*, 33, (*1947*), Part I, pp. 9–30, 9 pl., 1949.

In this further contribution to the present series of studies [*R.A.M.*, 28, p. 497] the author gives descriptions of a new species, *Poria quercuum*, which causes a white indeterminate decay of *Quercus stellata* and probably other *Quercus* spp., and a new variety, and full accounts of eight other species, including *P. cocos* (the tuckahoes, the sclerotia of which have at times been used as food and the fungus itself is probably parasitic on pine), *Polyporus balsamenus*, which produces a brown, cubical rot of *Abies balsamea* and other trees, *P. adustus*, responsible for a white, mottled decay of *Populus* and other hardwoods, occasionally of conifers, extending into the heartwood and affecting logs, and *Fomes earlei* causing a yellow rot of *Juniperus* spp. The reactions of some of the fungi in culture are also given.

Moreau (C.) & Moreau (Mireille). **Quelques précisions sur la nomenclature des Mélanconiées proches des Pestalozzia.** [Some points in the nomenclature of the Melanconiaceae near *Pestalotia*.]—*Bull. Soc. mycol. Fr.*, 64, 3–4, pp. 187–192, 6 figs., 1948.

After briefly reviewing the history of *Pestalotia*, *Monochaetia*, *Amphichaeta*, *Diploceras*, and *Pestalozzina*, the authors give notes on their observations of the

spores of representatives of these genera. Their work confirms the synonymy of *Hyaloceras* and *Monochaetia*, and establishes that of *Disaeta* and *Amphichaeta*. They draw attention to the differences between the dried-up, broken end of the conidiophore and the basal appendage and show that there is only one basal appendage in *Diploceras hypericinum*.

Garga (R. P.). **Schizanthus sp. a host of Tobacco leaf-curl virus.**—*Curr. Sci.*, 18, 7, pp. 260–261, 2 figs., 1949.

In January, 1949, *Schizanthus* plants at the Indian Agricultural Research Institute, New Delhi, were observed to be stunted (below 12 in. instead of the normal 24 in. in height), with abnormally small, bronzed, downward-curling leaves, and leaflets with inward-rolling margins. The diseased plants presented a generally crowded aspect. No flowers were produced by severely infected specimens and relatively few by those with milder symptoms, no seed being set in the latter case.

The disease was transmitted by grafting to Harrison's Special tobacco, *Datura stramonium*, and Sutton's Early Market tomato. On tobacco downward curling of the young leaves was noted about five weeks after inoculation. It was accompanied by puckering and chlorotic areas on the lower leaves. The veins on the under side showed greening and thickening in places, followed by the development of small, cup-shaped enations. The leaves were much stunted and the plant as a whole considerably dwarfed. *D. stramonium* exhibited marked downward curling, stunting, mottling, and wrinkling of the leaves, and the symptoms on tomato were almost identical.

White flies (*Bemisia tabaci*) fed in micro-cages on diseased *Schizanthus* plants for 24 hours produced typical tobacco leaf curl virus symptoms on transference to young plants of Harrison's Special tobacco in the insect-proof house [*R.A.M.*, 24, p. 292]. The importance of *Schizanthus* as a host of the virus lies in its potential role as a source of infection to other economic crops.

Lauffer (M. A.) & Robinson (Gloria). **The effect of glycerine and aniline on Tobacco mosaic virus infectivity.**—*Arch. Biochem., N.Y.*, 22, 1, pp. 119–121, 1949.

Four different tobacco mosaic virus preparations were dispersed for ten-minute periods in mixtures containing varying amounts of glycerine and aniline. Subsequent counts of the lesions developing on *N[icotiana] glutinosa* after inoculation with the treated viruses showed significant decreases in infectivity in two of them but no substantial loss of virulence in the other two, even in solvents with a volume composition of 50 per cent. aniline, 48 per cent. glycerine, and 2 per cent. water.

Dusting Tobacco plantbeds for blue-mold control.—*Mimeogr. Pap. Ga cst. Plain Exp. Sta.* 42, 1 p., 1947. [Received March, 1949.]

Treating tobacco beds regularly twice a week with 15 per cent. fermate dust gives excellent control of blue mould [*Peronospora tabacina*: *R.A.M.*, 27, pp. 163, 437; 28, p. 313]. Thirty lb. (4½ lb. fermate to 25½ lb. filler) may be required for a bed of 100 sq. yds. in an average season. As a substitute for fermate, 10 per cent. dithane Z–78 dust may be used. Dusting should begin each season before infection appears or when the plants reach the full four-leaf stage. When mould is expected, every plant should remain coated with dust. Dusting should always be effected immediately after any rain. Very small plants may be dusted at the rate of 1½ to 2 lb. dust per 100 yds. at each application, the rate increasing to 3½ lb. when the plants are large. As soon as mould appears the dust should be applied at the maximum rate, whatever the plant size. Beds under 4 yds. wide can be dusted through

the cloth, which should be at least 6 in. above the ground. It is best to remove the cloth before dusting wide beds.

Scaramuzzi (G.). **Metodi rapidi di diagnosi delle carenze minerali nel Tabacco.** [Methods of rapidly diagnosing mineral deficiencies in Tobacco.]—*Tabacco*, 53, 598, 5 figs., 1 diag., 1949.

The author describes 'absorption' methods for the diagnosis and treatment of abnormalities due to mineral deficiencies [*R.A.M.*, 27, p. 42] and the application of these methods to tobacco plants by means of injections into the leaf veins, leaf stalk, and shoot tip.

Costa (A. S.). **Duas novas moléstias de vírus do Tomateiro em São Paulo.** [Two new Tomato virus diseases in São Paulo.]—*Biológico*, 15, 4, pp. 79–81, 2 pl., 1949.

Two new virus diseases of tomatoes are reported from the central zone and Campinas, São Paulo, Brazil. 'Yellow top' is characterized by chlorosis of the apical regions of the plant, accompanied by some reduction in the size of the leaves and other parts. The examination of individual leaflets reveals an accentuation of the yellowing along the margins and generally an abnormal degree of rugosity. The rudimentary leaflets tend to curve at the tips, presenting a shell-like or concave aspect. The disease, which may affect upwards of 15 or 20 per cent. of the crop, does not destroy the plants but it reduces the yield. 'Yellow top' is liable to confusion with the curly top of tomato and tobacco caused by a strain of the beet curly top virus but the marginal chlorosis and apical rolling of the leaflets are distinctive features of the former. The two diseases have been observed together on the same plant.

'Yellow top' does not appear to be seed-borne, nor was it transmissible by means of mechanical inoculations. The aphids *Myzus persicae* and *Macrosiphum solanifolii* are the vectors of the disease in nature and probably responsible for its dissemination in the field. They should be combated by the application of insecticides, e.g., nicotine sulphate or rhodiatox, to the seed-beds, transplanting plots, and young plants in the field.

'Superbudding' or 'giant calyx' is of rare occurrence in tomatoes, having been observed only twice in the central zone and once in Caraguatatuba, and is devoid of economic importance. However, a form of the disease apparently due to the same virus is fairly common on *Erigeron bonariensis* in various parts of the State. So far the virus has been transmitted from plant to plant only by means of grafting or *Cuscuta*. It is evidently a member of the tomato big bud group.

Smith (K. M.). **Tomato black-ring : a new virus disease.**—*Parasitology*, 37, 3–4, pp. 126–130, 2 pl., 1946.

The longevity *in vitro* of the virus causing tomato black ring [*R.A.M.*, 24, p. 292] is seven days or more, the thermal inactivation point about 58° C., and the concentration in the host plant low. It is essentially a disease of young plants, which rapidly lose their symptoms if they survive the severe initial attack. It was shown by inoculation that the virus may be carried without symptoms by a number of ornamental herbaceous plants; it persisted only in *Dipsacus sylvestris* and *Antirrhinum majus*.

The writer has confirmed Kassanis's observation that the virus produces enations on the lower surface of cucumber leaves, but found that they develop only on the greenhouse type of cucumber. Tobacco, *Nicotiana glutinosa*, *Datura stramonium*, *Petunia* sp., spinach, and New Zealand spinach (*Tetragonia oleracea*) were infected by inoculation.

Roland (G.). **Enkele onderzoekingen en waarnemingen over de bronsvlekkenziekte van de Tomaat en over het Komkommermozaiek.** [Some studies and observations on the Tomato spotted wilt disease and Cucumber mosaic.] —*Tijdschr. PlZiekt.*, 55, 3, pp. 137–141, 2 figs., 1949. [French summary.]

The author's observations on the symptoms of the tomato spotted wilt and cucumber mosaic viruses on *Dahlia* in Belgium have already been noticed from another source [*R.A.M.*, 27, p. 588]. The present paper also includes notes on the effects of cucumber mosaic virus on tomato [ibid., 19, p. 60 *et passim*], spinach [ibid., 23, p. 423], and lily [ibid., 28, p. 174].

Wilson (J. D.) & Runnels (H. A.). **Tomato anthracnose loss.**—*Ohio Fm & Home Res.* (formerly *Bi-m. Bull. Ohio agric. Exp. Sta.*), 33, 251, pp. 67–70, 2 figs., 1948.

Four years' varietal resistance tests in Ohio showed that tomato varieties of short vine growth, such as Bounty and Victor, are always subject to heavy losses from anthracnose [*Colletotrichum phomoides*: *R.A.M.*, 28, p. 313] in areas where the fungus is abundantly present. The same applies to varieties with an open habit of growth and rather sparse foliage, such as Earliana and Fordhook Hybrid. The average amount of infection (over the four years) on vines defoliating early was 41 per cent., as against only 24 per cent. on those that defoliated late. These facts would appear to indicate that susceptibility is increased by early and excessive exposure to sunlight and by early and intimate contact with the soil.

The data for 1946 indicated that pink varieties, such as Ponderosa, Gulf State Market, and Globe, are highly susceptible, ten typical pink varieties having a higher average infection than ten typical red ones. Some canning varieties, such as Baltimore and Stokesdale, contract the disease to a lesser extent than many other varieties. Spraying susceptible varieties with zerlate (2–100) reduced infection in the authors' experiments by an average of about 80 per cent.

Wilson (J. D.) & Sleesman (J. P.). **Spray or dust staked Tomatoes for greater yields.**—*Ohio Fm & Home Res.*, 33, 252, pp. 100–103, 1 fig., 1948.

Growers in Ohio are recommended to spray or dust staked or trellised tomatoes with a fungicide to control defoliation that might result from early or late blight [*Alternaria solani* and *Phytophthora infestans*, respectively: *R.A.M.*, 28, pp. 22, 91]. The first application should be made when the fruits of the first cluster are half-grown, and it should be followed by at least four more at ten-day intervals. The sprays recommended are the fixed coppers (4–100), dithane Z–78 (2–100), and parzate (2–100). If late blight is seldom troublesome, good control of early blight may be obtained with zerlate (2–100). If late blight develops, the last two applications should be made with the fixed coppers (containing 7 per cent. of copper as the metallic equivalent).

Reid (W. D.). **Tomato-speck of Tomato.**—*N.Z. J. Sci. Tech.*, A, 30, 1, pp. 5–8, 3 figs., 1948. [Received August, 1949.]

Tomato speck (*Pseudomonas punctulans*) [cf. *R.A.M.*, 12, p. 555; 19, p. 49; 24, p. 252] was first observed in New Zealand in 1944 at Hastings, where it caused serious stunting of the Tatura dwarf variety in a field crop. The crop was raised from imported seed, and young plants in seedling boxes displayed extensive leaf infection.

The disease has not become widespread in New Zealand, where the symptoms on field specimens and those resulting from glasshouse inoculations agree with those described by Bryan [ibid., 13, p. 279], though natural stem lesions have not been observed in New Zealand. The morphological, cultural, and physiological characters

of the causal organism also agree with those described by Bryan [loc. cit.] except that the New Zealand organism has not produced ammonia. It caused only a slight colour change in lactose and maltose in 30 days, but there was a definite acid reaction in 34 days.

Plakidas (A. G.). **Witch's broom, a graft-transmissible disease of Arizona Ash (Fraxinus berlandieriana).**—Abs. in *Phytopathology*, 39, 6, pp. 498–499, 1949.

A 20-year-old Arizona ash (*Fraxinus berlandieriana*) tree at the Louisiana State University was observed in September, 1943, bearing yellowish leaves, about a quarter to a third of the natural size, and multiple spindly, wire-like shoots. Of six main branches arising from a common crotch, one was completely diseased to the top, four had scattered infected shoots about half-way to the top, and one was healthy. The diseased foliage persisted into the late autumn, long after the healthy leaves had fallen. Cuttings from the diseased tree failed to root. Three young, healthy trees in 12 in. pots were grafted in August, 1947, by in-arching diseased shoots, and two unions were effected. The only symptom developing in the first season was a pale green coloration of the foliage, compared with the dark green of the control, but the next year the grafted trees produced only weak shoots 1 to 3 in. long, bearing small, yellowish leaves, and there was considerable die-back. One of the trees, after putting out vestigial growth with minute, yellow leaves from several buds, died back to the ground. The controls attained a height of 4 to 6 ft. The original tree, largely necrotic, was felled in 1947. The disease has also been found on other trees of the same species.

Coe (D. M.) & Wagener (W. W.). **Ash anthracnose appears in California.**—*Plant Dis. Reptr*, 33, 5, p. 232, 1949. [Mimeographed.]

During the late spring and early summer of 1948 a noteworthy outbreak of ash anthracnose (*Gloeosporium aridum*) [*R.A.M.*, 27, p. 502] occurred in the Central Valley region of California. By 16th April infection was well advanced in street, park, and home plantings in the Sacramento area, both the normal form of *Fraxinus velutina* and the Modesto variety of this species being affected. The disease was most marked in the lower portions of the crowns, more than half the leaves being shed in some instances. Numerous small, elliptical cankers were present at the base of the current season's growth, causing the partial or complete girdling of young shoots. The disease was also present in other localities, having been favoured, apparently, by a delayed spring with prolonged rains and cool temperatures. As far as is known the disease had not been observed in California before 1947.

Caroselli (N. E.) & Tucker (C. M.). **Pit canker of Elm.**—*Phytopathology*, 39, 6, pp. 481–488, 3 figs., 1949.

Pit canker of the American elm (*Ulmus americana*), which is widely distributed in New York, Pennsylvania, Connecticut, and Massachusetts, has been known for over 40 years, but hitherto its cause has remained obscure. Although the immediate effects of the disease are not striking, the presence of numerous cankers on the trunk often results in a decline, besides marring the beauty of the tree. In general, the distribution of pit canker (which also affected *U. fulva*) is sporadic, but in certain areas over 60 per cent. of the elms are infected.

External symptoms of the disease include concentrically zonate cankers on the trunk and sometimes on the scaffold branches. The host reacts to invasion by the causal organism, which is identified as a new species of *Phytophthora* and named *P. inflata*, by the development of callus tissue, which is infiltrated in its turn and the concentric ring formation results. Cankers tend to be masked by the thick bark of the trunk. From small fissures near their margins 'bleeding' often occurs in the

form of a red-brown exudate, quite distinct from the light brown or dark grey of slime flux. In severely infected trees the depressions formed by the cankers and the sloughing of the bark near the diseased areas lead to roughness and irregularity of the trunks. Indications of a sharp decline of diseased trees are sparse yellow and pale green foliage, reduced terminal twig growth, and in some cases die-back of the twigs and small branches.

Internal symptoms of pit canker are red-brown tissues in the phloem, the cambium, and the outer area of the xylem. Adjacent cankers on the trunk are frequently connected by strands of discoloured, infected tissue.

P. inflata, which was isolated from 15 out of 25 street elms at Greenwich, Connecticut, in 1946–7, is characterized by limoniform to elongate, papillate sporangia, 20 to 67 by 15 to 32 (average 38 by 23) μ; biflagellate zoospores, reniform in the motile and spheroidal in the quiescent stage, 10 to 12 μ in diameter; thin-walled, hyaline, spheroidal oogonia, with narrow stalks, 30 to 42·7 (34) μ; spheroidal, smooth, hyaline to straw-coloured, fairly thick-walled (3 to 4 μ) oospores, 26 to 39·3 (31·3) μ, nearly filling the oogonium, with densely granular contents, usually provided with a single large reserve globule and frequently one to four smaller globules; and paragynous, inflated, usually variously contorted, often irregularly lobed or branched antheridia, up to 50 by 15 μ, arising from a separate or occasionally from an oogonial hypha.

The fungus grows well on standard agar media, with an optimum on maize meal at 25° to 30° C. Sporangia are rare on agar but develop in profusion on washed mycelial mats transferred from seven-day pea broth cultures to sterile distilled water and incubated seven days. Oogonia and antheridia are abundant on maize meal agar but somewhat smaller than those on oatmeal. In its large oogonia and oospores *P. inflata* resembles *P. megasperma* [*R.A.M.*, 11, p. 303] and *P. erythroseptica* [ibid., 1, p. 399]. In apple fruits inoculated through incisions *P. inflata* caused a firm, rapidly spreading brown rot, and about half a potato tuber was invaded by the fungus within one week. After a few minutes' exposure to the air the infected potato tissue developed a bright pink colour. The brown and pink rots of apple and potato, respectively, were similar to those associated with numerous other *P.* spp. [ibid., 10, p. 754].

The pathogenicity of *P. inflata* was tested on 27 elms ranging from 3 to 17 in. in diameter and growing on low, wet or on high, dry sites, inoculations being made through vertical wounds in the trunk. About five weeks after the inoculation a soft, dark brown exudate began to appear on 81 per cent. of the trees, while the controls remained healthy. As the season advanced, the underlying tissue became necrotic and cankers were formed similar to those from which the pathogen was isolated. By the spring of 1947, 83 per cent. of the trees showed symptoms of pit canker. Re-isolation from the infected tissues consistently yielded a *Phytophthora* identical with the isolate used for inoculation.

MILLER (P. W.). **Dusting for the control of Walnut blight.**—*Rep. Ore. St. hort. Soc., 1948*, p. 130, 1949.

The results of further studies on the control of walnut blight [*Xanthomonas juglandis*: cf. *R.A.M.*, 27, p. 590; 28, p. 94] in Oregon in 1948 showed that in a Franquette orchard six, weekly applications of a copper-lime-sulphur-oil (15–30–10–1·5) dust, beginning in the early pre-bloom stage, reduced the incidence of blight infection on the nuts from 46·9 to 5·7 per cent. In one Oregon orchard the grower reported that five applications of this dust made at approximately weekly intervals, beginning in the early pre-bloom stage, reduced the incidence of infected nuts from 42·3 to 6·1 per cent.

From this year's results and those of previous years it is concluded that a minimum of five dust applications, beginning in the early pre-bloom stage, should

be made. In an extremely rainy season extending well into the post-bloom stage, six applications may be necessary to keep blight infection at less than 5 per cent. Under no conditions should more than eight days elapse between treatments.

A mixture composed of 15 per cent. monohydrated copper sulphate, 80 per cent. hydrated lime, 10 per cent. sulphur, 37·5 per cent. talc, 3 per cent. bentonite, 3 per cent. diatomaceous earth, and 1·5 per cent. light mineral oil was practically as efficacious as were stronger monohydrated copper sulphate dusts, under the conditions prevailing in 1948, and costs only about two-thirds as much as the 20 per cent. monohydrated copper sulphate-lime dust recommended in the past.

Foster (H. H.), Musser (A. M.), Higdon (R. J.), & Hughes (M. B.). **Pecan scab spray experiments in South Carolina during 1948.**—Abs. in *Phytopathology*, 39, 6, p. 496, 1949.

Spraying experiments were carried out at two locations in South Carolina in 1948 to determine the relative efficiency of various fungicides in pecan scab (*Cladosporium effusum*) control [*R.A.M.*, 28, p. 258] on the susceptible Schley variety. The nuts on the untreated trees showed 77 to 99 per cent. severe infection. At the Edisto Experiment Station Bordeaux mixture (4–1–100 for the first and 6–2–100 for the second, third, and fourth cover sprays) gave effective control of the disease and increased the size and weight of the nuts, while zerlate and karbam white (2 lb.–100) proved unsatisfactory. At the Orangeburg plots Bordeaux mixture, copper–A (3 lb.–100), zerlate, and parzate (2 lb.–100) gave practical control of the pathogen and augmented yields, zerlate being superior to the other fungicides tested. Splitting of the shells (partly due to scanty rainfall) was more prevalent in the Bordeaux-sprayed nuts than in those of the other series of treatments.

Gregory (P. H.), Peace (T. R.), & Waller (S.). **Death of Sycamore trees associated with an unidentified fungus.**—*Nature, Lond.*, 164, 4163, p. 275, 1 fig., 1949.

Further observations on the unidentified disease of sycamores (*Acer pseudoplatanus*) in south-west Essex [cf. *R.A.M.*, 28, p. 429] revealed that in later stages the tree is girdled and killed. The wood beneath young lesions is stained yellow-brown but when the tree is dead the wood is pale and dry. The staining travels up and down the tree, well beyond the external limits of the lesions and sometimes for the whole height of the trunk and main limbs. It is assumed that once the tree is infected the fungus moves freely in the vessels, producing fresh lesions whenever it comes into contact with cambium. There is thus a strong resemblance between this disease and canker stain of plane trees (*Platanus* spp.) [ibid., 27, p. 341] and sapstreak of sugar maple [*Acer saccharum*: ibid., 24, p. 212] in the United States, both caused by a species of *Endoconidiophora*.

When the outer bark of affected sycamores was peeled off, both the inner and outer portions were found to be covered by a thin plectenchymatous stroma, the inner stroma bearing a closely packed hymenium of short phialides. The brown, unicellular, smooth, spherical to oval spores, measuring 3 by 2 μ, were borne in fragile chains. The inner and outer stromatic layers were connected by plectenchymatous columns which may be seen as a close layer of fine projections on the bark when the spores filling the interstices have blown away. Spore production is of the order of 10^9 per sq. cm. The occurrence of other stages in the life-cycle of the fungus is suspected but not yet proved. The fungus appears to be a destructive parasite of sycamores and must be regarded as a pathogen of primary importance. From a single tree seen in 1945 the disease has now spread over a mixed woodland area of about 70 acres, where more than 100 sycamore trees became affected and have been destroyed as a precautionary measure.

Snyder (W. C.), Toole (E. R.), & Hepting (G. H.). **Fusaria associated with Mimosa wilt, Sumac wilt, and Pine pitch canker.**—*J. agric. Res.*, 78, 10, pp. 365–382, 3 figs., 1949.

Comparative studies are described on the cultural characters, taxonomy, and nomenclature of *Fusarium* clones pathogenic to and associated with wilt of mimosa (*Albizzia julibrissin*) [*R.A.M.*, 28, p. 365] and sumac (*Rhus typhina*) (abs. in *Phytopathology*, 38, p. 572, 1948), and pitch canker of *Pinus virginiana*, *P. echinata*, *P. caribaea*, and *P. palustris* [*R.A.M.*, 27, p. 224]. Single spore and hyphal tip isolates obtained from the hosts and grown in suitable agar culture media were used for the determinations.

The trinomial *F. oxysporum* f. *perniciosum* (Hepting) Toole is accepted for the mimosa wilt pathogen and *F. oxysporum* f. *rhois* Snyder & Hepting n.f. is proposed for the sumac wilt pathogen and *F. lateritium* f. *pini* Hepting n.f. for the pine pitch canker organism.

Some natural clones (a term by which the authors denote any strain isolated directly from nature or 'wild type') of *F. oxysporum* f. *perniciosum* produce abundant mycelium with few, slowly formed sporodochia; others form sporodochia rapidly and abundantly; while still others are intermediate in appearance or differ in pigmentation from white to salmon to vinaceous shades or in their ability to develop sclerotia. Macroconidia may agree in size with those described earlier by Hepting for *F. perniciosum* [ibid., 19, p. 313], or they may be much larger, or otherwise show morphological variability. As an aid in recognizing the variability within this form the more common clones are briefly described. Other fungi commonly found on the bark of wilted mimosa, viz., *Hypomyces solani*, *Calonectria rigidiuscula*, *Nectria episphaeria* [ibid., 25, p. 366], *Gibberella lateritia* [loc. cit.], *G. rosea* [loc. cit.], *N. cinnabarina*, *Thyronectria austro-americana* and *Eutypa heteracantha*, are described.

Only one clone of *F. oxysporum* f. *rhois* occurred in nature. On potato dextrose agar it produced cultures typical of *F. oxysporum*. Single-spore clones of the sumac fungus, which have proved very unstable in culture and have yielded several mutants, belong to *F. oxysporum* and were pathogenic to sumac. Neither *F.o.* f. *rhois* nor *F.o.* f. *perniciosum* was pathogenic to the host of the other fungus. The two forms are indistinguishable microscopically and some of their mutants are identical.

The identity of the *Fusarium* causing pitch canker of pine is of particular interest because this is the first disease of pines, apart from seedling diseases, ascribed to a *Fusarium* and because of the value the fungus may have in prolonging gum flow from chipped pines. So far, the pitch canker fungus has been isolated from several species of pines from seven southern States. No fructifications were observed except where the wood of an active canker was artificially exposed or after artificial inoculation of a chipped surface.

In 1947, about 60 single-spore isolates from the four species of pine mentioned above were assembled. All the natural clones in culture produced a white fluffy mycelium which, in some, tended with age to become pigmented with shades of blue, grey blue, green blue, or purple. Many clones developed a purple pigment in the mycelium lying in contact with the glass. Some produced dark bluish sclerotia. Many other natural clones differed in these and other characters, and are described. Sporulation was rare unless the cultures were kept out of doors. The sporodochia of all natural clones thus grown were orange-coloured and macroconidia were 3- to 5- septate, with a tendency to form a slight hook on the apical cell. The apical-cell hook, the preponderance of macroconidia in optimum culture, and the absence of chlamydospores and chain-formed microconidia place the fungus in *F. lateritium* [*G. lateritia*]. Natural clones mutated, the commonest mutant being a pionnotal variant. Others differed in amount of pigmentation, amount and

character of mycelium, and growth rate. Fresh isolates of *G. lateritia* from *Albizzia* were used to make parallel inoculations in Virginia pine in conjunction with the pine form. Cankers and gum flow were obtained only with the pine isolate, which is therefore considered to be a new form. The only other *Fusarium* isolated from pine wounds was *F. roseum* (*G. rosea*); this also failed to produce lesions when inoculated into *P. virginiana*.

Lindgren (R. M.). **Care needed in thinning Pines with heavy fusiform rust infection.** —*For. Fmr*, 7, 12, p. 3, 2 figs., 1948.

In attempting to control fusiform rust (*Cronartium fusiforme*) [*R.A.M.*, 28, p. 148] on slash, loblolly, and other pines [*Pinus caribaea*, *P. taeda*, and *P.* spp.] in the southern United States it is safer to leave some affected trees than to thin heavily cankered, young stands too much. The amount of cutting done in such stands should be no more than is necessary to avoid stagnation. If a stand requires little or no thinning, cutting should be restricted to usable trees likely to die before the next thinning. In other stands stem-cankered trees should be removed first, then those with branch cankers near the trunk. Trees with branch cankers more than 18 in. distant from the trunk are often as safe to leave as uninfected ones. How long infected trees will remain salvageable largely depends on the species, size of tree, type of cankering, and number and violence of storms. Salvage possibilities are generally better for large than small trees and for longleaf [*P. palustris*] and loblolly than for slash pine.

General observations on slash pine of early thinning age (15 to 20 years) indicate that in the case of trees with branch cankers only, which are more than 18 in. from the trunk, salvage is fairly certain, regardless of date of next thinning, while if the distance is less salvage is probable for at least eight years. For trees with trunk cankers, if under 50 per cent. of the trunk circumference is killed there is more than an even probability of salvage for eight years. If more of the circumference is killed, but there is no bend in the trunk at the canker or deeply sunken canker face, there is at least a possibility of salvage for five years. But if there is a bend or a deeply sunken canker face, then there is less than an even chance of salvage within five years.

A shift to more resistant species or, if this is impracticable, the encouragement of dense stands of the species now in use should be the goal in the new forest. Of the southern pines shortleaf [*P. echinata*] is most resistant (virtually immune), followed by longleaf (highly resistant), loblolly, and slash pine.

Lindgren (R. M.) & Henry (B. W.). **Promising treatments for controlling root disease and weeds in a southern Pine nursery.**—*Plant Dis. Reptr.*, 33, 5, pp. 228–231, 1949. [Mimeographed.]

Southern pine [*Pinus* spp.] nursery beds in Mississippi are affected by a perplexing root rot. When one-year-old stock is lifted some seedlings show a reddening and roughening of the cortex in localized areas on the tap and larger lateral roots, while others show lateral roots and the lower part of tap roots blackened or completely rotted. Proliferation of secondary roots above the rotted part of tap roots is not uncommon. Severe root damage may occur without noticeable aboveground symptoms. Poor survival of infected seedlings in field plantings rather than high mortality in nursery beds generally causes most concern. Tests were made in blocks of *P. palustris* and *P. caribaea* with 16 soil treatments; two fumigants, chloropicrin and ethylene dibromide (575 and 360 lb. per acre, respectively), were outstanding in degree of control given. Plots treated with these materials displayed hardly any severe rot and very little of the lighter type. Over 80 per cent. of the untreated *P. palustris* seedlings were severely rotted and none were healthy. Formaldehyde and allyl alcohol appeared to rank next in effectiveness, but were

significantly inferior to the two fumigants. Striking control of weeds was obtained until mid-June in all plots treated with allyl alcohol (360 lb.). Further work is in progress.

KAMEI (S.). **Studies on the cultural experiments of the fern rusts of Abies in Japan.** —*J. Fac. Agric. Hokkaido Univ.*, 47, 1, 91 pp., 4 figs., 1940. [Received August, 1949.]

In this paper the author records the results of his personal observations on the life-history of nine species of *Uredinopsis* [*R.A.M.*, 18, p. 551; 26, p. 60] on *Abies* spp. in Japan, which have their antithetic phases parasitic on ferns, and also of comparative studies on their peridermial phases, which enables him to give a key to the species on *Abies*. Economic considerations of some of them are also given.

SCHEFFER (T. C.), ENGLERTH (G. H.), & DUNCAN (CATHERINE G.). **Decay resistance of seven native Oaks.**—*J. agric. Res.*, 78, 5–6, pp. 129–152, 6 graphs, 1 map, 1949.

This is a full account of laboratory decay tests of oak wood samples, the preliminary results of which have already appeared [*R.A.M.*, 26, p. 178]. Heartwood samples were taken from 375 trees of the following oak species, white (*Quercus alba*), Oregon white (*Q. garryana*), chestnut (*Q. montana*), swamp chestnut (*Q. prinus*), northern red (*Q. borealis*), scarlet (*Q. coccinea*), and black (*Q. velutina*). The trees were located in nine important oak-growing regions in the eastern United States and in well-separated localities in each region. *Poria monticola*, *Lenzites trabea* [ibid., 28, p. 148] (both causing brown rot), and *Stereum frustulatum* (causing a white pocket rot) were used for tests of all variables except diameter at breast height (d.b.h.); for the relation between this and decay, *P. monticola*, *S. frustulatum*, and *Polyporus* [*Polystictus*] *versicolor* (white rot) were used. In order to determine whether the conclusions derived from the first tests would also apply to decay by strictly white rot fungi, a repeat test was made on wood blocks using *Poria monticola*, *Polystictus versicolor*, and two additional unidentified white rot fungi, Madison 4411–1 and Madison 517 [*Polyporus tulipiferus*: ibid., 24, p. 299].

Among the white oak group, and especially with *Q. alba* and *Q. prinus*, individual trees of the same species, of approximately the same size, and in the same locality differed markedly from one another in resistance. Significant differences also occurred between localities in the same region. The results indicate that it may be possible to obtain especially resistant oak wood from selected localities. Although the use of white oak provides assurance of superior decay resistance in general, some individual trees of this species and most of the trees in certain localities may be only moderately resistant. The differences appear to be genetic rather than environmental.

The outer heartwood of *Q. alba* trees in approximately even-aged stands increased in decay resistance as the d.b.h. increased. In *Q. borealis*, *Q. prinus*, *Q. alba*, and *Q. montana* the resistance to decay by *Poria monticola*, *L. trabea*, and *S. frustulatum* decreased progressively in going from the outermost heartwood to the pith, in both the basal and the upper portion of the trunks. Radial differences in resistance to decay by *Polystictus versicolor*, Madison 517, and Madison 4411–1 were generally smaller, and in *Q. alba* an opposite trend was indicated by the two last-named fungi. The differences in the decaying power of *Poria monticola*, *L. trabea*, and *S. frustulatum* were large enough to account for very considerable differences in the service life of wood from different parts of the same large log. In the same four oak species the heartwood in the upper trunks was, with one exception, more resistant to all the fungi than that in the lower trunks. In *Q. prinus* this difference was exhibited in resistance to *Poria monticola*, *L. trabea*, and *S. frustulatum* but not in resistance to the three typical white rotting species.

Neither the specific gravity of the wood nor the rate of growth appeared to be major criteria of resistance.

The variability in decay resistance with locality, tree size, and position of the wood in the tree, as well as the uncorrelated differences among trees, indicate that comparisons of species for decay resistance may be unreliable unless many trees from numerous localities are sampled and unless the trees are of approximately the same size and the samples taken from about the same place in each tree [cf. ibid., 28, p. 200]. Cores must be taken at a uniform height, and if taken 8 or 10 ft. from the ground, they would represent the tree as a whole better than if taken $4\frac{1}{2}$ ft. from the ground as in the present study.

DILLER (O. D.). **Treated fence posts last longer.**—*Ohio Fm & Home Res.*, 33, 252, pp. 87–90, 2 figs., 1948.

In the spring of 1946, 200 American elm posts in Ohio were treated with 2 per cent. copper naphthenate cold dip. These were planted and are under observation. In the autumn and winter of 1947, 500 posts of various conifers and hardwoods were cold-soaked in copper naphthenate (containing 1 per cent. and $\frac{1}{2}$ per cent. copper metal) for 6 and 16 hours in a horizontal tank. The results showed that it is not practical to treat for over six hours, as absorption declines rapidly after the first hour or two. The pines (*Pinus* spp.) soaked for six hours took up an average of 3·7 lb. of 1 per cent. solution at a cost of 26 cents per post. The same species absorbed 5·2 lb. of $\frac{1}{2}$ per cent. solution at a cost of 23 cents per post. The average absorption of all hardwoods in 1 per cent. copper naphthenate was about $1\frac{1}{2}$ lb., at a cost of 11 cents per post. The pines soaked for six hours showed about 16 per cent. increase in weight and the hardwoods about 5 per cent. Experience indicates that copper naphthenate extends the life of a non-durable wood to at least 15 years.

BLEW (J. O.). **Service tests on posts as a means of evaluating wood preservatives and methods of treatment.**—*Rep. U.S. For. Serv. For. Prod. Lab.*, D 1726, 10+5 [unnumbered] pp., 1 pl., 1948. [Mimeoprinted.]

After pointing out that tests on posts constitute one of the simplest and most convenient forms of service tests of wood preservatives, the author states that such tests should consider not only the immediate future but also the follow-up work which will be carried out by other investigators. The value of many such tests has been lost because of failure to carry the programme on beyond the first stages. Suggestions are made, therefore, as to how these tests should be carried out, the points dealt with comprising the selection of suitable posts, the number required and their identification by tags or branding, the selection of preservatives and the recording of weights, volumes, and solution concentrations, methods of treatment or of applying the preservatives, installation of the posts and their inspection, and the recording and reporting of the results. A bibliography of 13 items is appended, together with some specimen records.

CROSSLEY (T. L.). **Fungus infection in groundwood pulp.**—*Pulp Pap.* (*Mag.*) *Can.*, 50, 4, pp. 85–86, 1949.

Bales (300 lb. each) of wood pulp imported into Canada from Sweden in the summer of 1947 were kamyr-pressed and billed at 55 per cent. air-dry, bound with wire and the edges reinforced with strips of wood, largely birch. When brought to the writer's attention, the pulp had been in storage in a dry, dark warehouse for six months and was giving trouble by failure to disintegrate in the beaters. Three types of fungal growth were observed on the bales, black, pink, and brown, the last-named predominating. It was accompanied by a brown stain with a sharply acid reaction, differing therein from the black and pink types, which produced

little discoloration and gave a very faint acid reaction or none. The black fungus was identified as a saprophytic species of *Torula*, the rare pink form was not determined, and the prevalent brown organism closely resembled *Cadophora* [*Phialophora*] *obscura* [*R.A.M.*, 17, p. 178]. Neither the black nor the brown types commonly occur in wood pulps, the latter being a sap stain. The source of infection was consequently suspected to lie in the strips of wood used to reinforce the edges of the bales. Solutions of iron salts were blackened on contact with the brown-stained areas, pointing to the implication of tannic or a related acid. The application of phloroglucin to the stained areas resulted in a much lighter coloration, indicating lignin reduction.

In the beater the stained pulp broke up into small, curdy lumps, some of which traversed the screens and reached the sheet, where they left concave spots, which in the case of coated paper and printed solids did not take the ink. In standard tests a period of 20 minutes was required for the stained samples as compared with five for clean ones. Both fibrous character and capillarity appear to be destroyed in the discoloured pulp.

It is recommended that wooden baling strips, especially birch, should not be used without creosoting or other fungicidal treatment. Pulp at 55 per cent. air-dry is too damp for protracted storage, and material showing signs of infection should be used as quickly as possible.

Rhoads (A. S.). **Decay in Balsa life floats and the value of brush and dip treatments with chlorinated phenol for its prevention.**—*J. Amer. Soc. nav. Engnrs*, 60, 4, pp. 565–595, 9 figs., 1948.

In the commercial manufacture of balsa (*Ochroma lagopus*) life floats no attempt has hitherto been made to incorporate either wood preservatives or water-repellents, apart from the waterproofing compound applied to the surface. It has been estimated by the Bureau of Ships that an annual replacement of 50 per cent. of the floats in use is necessary, and in July, 1946, the Industrial Test Laboratory of the Philadelphia Naval Shipyard was authorized to carry out a study with three objectives: (1) to make a survey of the decay occurring in balsa life floats and determine the role of moisture absorption in promoting its development; (2) to devise a rapid, economical, and effective means of treating the wood with a preservative solution which would increase its resistance to decay without adversely affecting its buoyancy or other properties; and (3) to determine the efficacy of such a procedure in the prevention of balsa decay by actual tests against wood-rotting fungi of wood so treated.

Among the fungi occurring on the floats were *Schizophyllum commune*, *Daldinia concentrica*, and *Polyporus adustus*. Three significant facts emerged from moisture determinations on 39 floats in outdoor storage, namely, (1) that the canvas covering is frequently useless in the prevention of water absorption and may deteriorate through the activity of moulds; (2) the high moisture content shown in places in many of the floats, if maintained over any considerable period, would greatly conduce to the development of decay; and (3) balsa is very susceptible to such decay, which frequently does occur under existing conditions.

As a result of experiments to determine the comparative resistance of untreated balsa and of blocks immersed for three minutes in a 5 per cent. chlorinated phenol preservative solution to *S. commune*, *Poria monticola* (formerly known as *P. microspora* [*R.A.M.*, 26, p. 573]), and *Lenzites trabea*, it is recommended that this treatment should be applied in the construction of new life floats, the period of immersion at room temperature to be extended to five minutes for the larger pieces of wood to allow a greater margin of safety. The wood should be left to dry at least overnight before glueing. The treating solution should conform to the requirements for Type B of the Navy Department Specification 52W5 (except that no

water-repellent ingredients shall be incorporated), i.e., it shall consist of at least 159 gm. chlorinated phenols per gal. solution, of which at least 95 gm. shall be pentachlorophenol.

Service and regulatory announcements. List of intercepted plant pests, 1947.—*S.R.A., B.E.P.Q., U.S. Dep. Agric.*, 69 pp., 1948.

Among the pathogens intercepted on plant material (pp. 3–4) entering United States territory from 1st July, 1946 to 30th June, 1947, inclusive [cf. *R.A.M.*, 26, p. 304] were *Cercospora musae* [*Mycosphaerella musicola*] from the Philippines (for the first time) and other countries, *Pestalotia psidii* on guava [ibid., 18, p. 233] from Puerto Rico and *Phoma psidii* on the same host from Mexico, *P.* [*Guignardia*] *citricarpa* on citrus [ibid., 26, p. 304] from the Philippines (first report), *Sphaceloma punicae* on pomegranate from Mexico, and *Tapesia rosae* on rose from Belgium and Finland.

Announcements relating to black stem rust quarantine (No. 38).—*S.R.A., B.E.P.Q., U.S. Dep. Agric.*, 171, p. 2, 1948.

The present amendment to the fourth revision (24th January, 1945) of the black stem rust quarantine (No. 38) [cf. *R.A.M.*, 24, p. 304], effective as from 15th March, 1948, designates as rust [*Puccinia graminis*] resistant *Berberis thunbergii* and its vars. *atropurpurea*, 'Globe', *maximowiczi*, *minor*, and *variegata*, and its f. *erecta*; these may be shipped to any State without permit or restrictions under the regulations in this subpart.

Conferencia Interamericana de Sanidad Vegetal 20 a 25 de Septiembre de 1948. Resoluciones. Actas. Convenio. [Inter-American Conference of Plant Sanitation, 20th to 25th September, 1948. Resolutions. Acts. Convention.]—119 pp., República Argentina, Ministerio de Agricultura de la Nación, Buenos Aires, 1949.

This is a full report of the proceedings of the Inter-American Conference of Plant Sanitation, held at Buenos Aires from 20th to 25th September, 1948, which resulted in the promulgation by the delegates of Argentina, Brazil, Paraguay, and Eastern Uruguay of a convention to establish the sanitary principles to be observed in inter-American commerce in agricultural products; to advise on the treatment to be followed between the countries containing continuous or discontinuous areas of dispersion of agricultural pests; to facilitate the exchange of technical procedures and information; and to co-ordinate the control measures and reaffirm the principles agreed upon at the International Convention of Agricultural Protection of 1913.

Under the 17 articles of the convention the Governments of the contracting countries guarantee, *inter alia*, to take the requisite legislative and administrative measures to secure common and effective action against the introduction and diffusion of agricultural pests (animal, plant, and virus); to organize, at the earliest practicable date, official services of plant sanitation; to prohibit the importation of any plants or parts thereof unaccompanied by duly authenticated certificates of origin (a model of which is annexed) vouching for their freedom from the particular pest or disease to be excluded, such measures to be taken only on the following grounds: (1) actual existence in the exporting country of dangerous pests, and (2) genuine necessity for the importing country to protect its crops serving as hosts of such pests; to co-operate in the work of plant protection by lending mutual aid and facilitating the exchange of information and technical personnel and co-ordinating control measures, and further, by the publication of a bulletin of relevant information; and every five years to convene an inter-American conference for the study of problems of international interest in the field of plant protection.